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Purdue University

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AN APPRAISAL OF FACTORS AFFECTING THE
PRODUCTIVITY OF EMPLOYEES IN A NAVAL ORDNANCE PLANT

A Thesis

Submitted to the Faculty

of

Purdue University

by

Charles Priest, jr.

W

In Partial Fulfillment of the

Requirements for the Degree

of

Master of Science

in

Industrial Engineering

May, 1954

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ABSTRACT

This study was conducted primarily to evaluate, and also to form a basis of comparison for continuing investigation of, manpower utilization and motivation in a Governmental production activity. The U.S. Naval Ordnance Plant, Indianapolis, was chosen for the survey. This Plant is under Bureau of Ordnance control and produces aircraft firecontrol equipment.

To investigate the situation a questionnaire was designed for submission to all employees in the producing group, consisting of the Industrial, Quality, Engineering and Research and Test Departments. At the same time, discussions were held with those executives in top and intermediate levels of management throughout the entire organization who could aid in the pursuance of the study. Records were sought for which could be intercompared either with other governmental activities or with private industrial concerns. These were expected to aid in assessing the productivity, or measure of industrial effectiveness, of the Ordnance Plant.

In comparing and evaluating employee opinion response to certain questions, use was made of the results of similar questions which had been asked 1) of employees at the Naval Ordnance Laboratory and 2) of technical, professional, non-supervisory employees of the Western Electric Company. Frequent reference was made to Navy Civilian Personnel Instructions

as to approved policies and procedures for managing manpower in Navy employ. NOPI manpower records, the only types which could be readily compared with others published in the literature and which used the same standards and methods of measurement, were resorted to as the only accurate means for obtaining factual data on productivity.

Tabulation of responses was divided according to whether the employee indicated he was "graded", that is, under the General Schedule classification in Civil Service -- a per annum or "white collar" worker, or "ungraded" -- a per diem or "blue collar" worker. Also, results were tabulated according to which Department the worker was in. In this way, inter-Departmental comparisons among similar general types of employees was possible. A total of 1654 usable returns resulted from the distribution of 2311 forms. The questionnaire was entitled THE NOPI OPINION and was of the anonymous, multiple-choice response type. The 1654 forms were taken to Purdue University for sorting, arranging, and key-punching of results on IBM machine cards as a further assurance of employee anonymity. The cards were taken to NOPI where they were tabulated.

On the basis of the interviews with members of management and observational visits to various parts of the different Departments, plus the evaluation of appropriate records, it was concluded that the Naval Ordnance Plant, Indianapolis, is

well managed, staffed, and operated. Its employees are, in general, well-trained for their respective jobs. Selection and placement procedures are good, and turnover is quite low. Safety is excellent, and absenteeism, or unexcused leave, is negligible. Reliability and near-perfection of the equipment produced is more important than cost. Exact production cost per unit is only roughly known. The type of manufacturing done may best be described as intermittent, small lot, non-repetitive. Because of this, the records of units produced at one given time are not comparable to units produced at another period. Because of the unique type of product, no other activity, private or governmental, can be used as a basis for comparison either as to units produced per given time or as to cost per unit.

On the basis of the results of the tabulated opinions and comparison to the others mentioned above, where possible, it was concluded that employee job satisfaction was high; communications were reasonably good; and supervision was good in general, but in need of improvement, especially in its ability to handle and get the most out of its working groups.

Very few grievances came up to the second stage or higher. This was true even though a noticeable percentage of employees thought that their supervisors ignored their complaints, or believed that their complaints were not settled fairly at the first level.

Job performance is not discussed with employees as often as it should be for best effectiveness.

Delegation of responsibility and authority is reasonably good, but needs to be improved.

A substantial number of employees is rather dissatisfied with the advancement made to date and feels that chances for advancement are not too favorable. Some employees feel this is due to favoritism.

Per Diem employees look most for "more security" in a higher level job, while Per Annum people look most for "a chance to do more responsible work"; both groups rate "more pay" very highly, however.

As to what determines who will be recommended for promotion, both groups feel strongly that the main factors influencing this are "how you stand with the person you work for" and "who you know in the Ordnance Plant". This indicates that favoritism, influence of cliques, and other forms of discrimination, although against policy, seem to be part of the promotion-influencing picture. This question resulted in the largest indication of a widely-held unfavorable opinion to be found in the entire questionnaire.

Employees further indicated that a considerable amount of improvement was possible in the arrangement of their workplaces, especially the Research and Test people.

Almost one-third of the Per Diem personnel and one-fifth of Per Annum employees believed that their work was interrupted "often" by lacks of materials, tools, supplies, or instructions, indicating great need for improvement.

Many felt that improvements were desirable in the methods and control of manufacture as presently conducted.

Most felt that equipment at NOPI is well above average, although some indicated their equipment to be in need of replacement.

Many employees didn't know enough about motion and time study to have an opinion as to whether it could be applied to NOPI effectively. Some did feel that it could be applied in certain areas.

The consensus was that forms used were well designed and called only for necessary information.

Employees in general weren't sure whether materials-handling times were excessive, normal, or low at NOPI. An increased awareness of the possibilities of cutting costs by utilizing carefully investigated methods should prove beneficial at NOPI.

Apart from experience on the job, one-fourth of the Per Diem employees and almost one-third of Per Annum personnel stated they get no training to speak of; a majority of both types felt they either got a "great deal" or "some" training, however.

Most employees when confronted by a personal problem try to work it out for themselves, although a considerable number consult with their supervisors. Very few go to the Employee Relations office for help.

Per Diem personnel in most cases feel that they are rated fairly, while Per Annum employees feel they are not, by the Civil Service performance rating system. It appears that the system is functioning as designed, but that many employees resent being in the broad classification of "average".

As to spending productive time on handling red tape connected with their jobs, a majority of employees felt this to be a minor factor.

Most employees like the Beneficial Suggestion Program but don't make suggestions. Increased training would appear to aid in this program's effectiveness.

About one-fifth of the participants in the questionnaire survey submitted comments in the space provided. These were listed by classification as to subject matter and representative comments were quoted which bore on the general areas of the study.

Summary. It is considered that NOPI management's careful and considered utilization of the information contained in this survey may prove beneficial in increasing the generally-noted highly favorable satisfaction expressed by employees. It is believed that over-all productivity of employees can be increased thereby. Efforts to decrease the widely-held opinion concerning favoritism as a basis for promotion should be undertaken. Both technical and human relations training for supervisors appears advisable on a continuing and broad-coverage basis.

AN APPRAISAL OF FACTORS AFFECTING THE PRODUCTIVITY OF EMPLOYEES IN A NAVAL ORDNANCE PLANT

INTRODUCTION

Why This Particular Study?

This study was conceived and carried through for several reasons. First and foremost was the desire to examine and appraise the utilization and motivation of manpower in a Governmental production activity. Much has been written and published in industrial relations research among private industry's employees. Not so much is known to the general public about industrial relations research conducted within selected Governmental areas, although many such studies have been conducted and reported. Partly, this is due to the fact that access to certain types of Federal installations, especially in the area of the Department of Defense, is limited by security regulations. Also, it is due to the fact that the information gained, even though of a non-classified nature from the security standpoint, is not too pertinent to the field of private industry. The profit motive is not present; Federal workers are under Civil Service regulations; other basic differences mitigate against wide-spread reporting to the general public, even though the data may be available upon request.

However, in Government as well as in private industry,

more and more managements are realizing that research into their employees' needs, motivations, and behaviors is important. What makes one organization outstanding while another similar one may be mediocre? Basically, it is the performance of the people employed, performance measured in terms of the overall cost of operating the organization as compared to the productive output of the activity. Increasing the amount and quality of the product while cutting the cost necessary to make it results in increased productivity, a phenomenon particularly typified by American historical experience. It is this increased productivity, or the ability to turn out more goods per unit of time with the same or less worker energy expenditure, which has made the United States foremost among the nations of the world in industrial capacity. Of course, many factors relate to this outstanding American ability to produce, but in this study the management, utilization, and motivation of the men and women comprising the organization will be emphasized.

Long ago the need for research into the field of physical, chemical, electrical, mechanical, and other areas of the so-called "natural sciences" was recognized and pursued. Hypotheses were proposed, experiments conducted, and gradually fundamental principles and laws were evolved and stated. Of course, this type of research has paid and is continuing to pay for itself thousands of times over. A wealth of data has been recorded over the centuries, providing basic

stepping stones for further research and refinement, and opening the way for further technological advance. Thus, we have radar, radio, television, radiant heating, 14,000 ton hydraulic presses, gas turbines, jet engines, H-bombs, automobiles, off-set printing, high-speed photography, low infant mortality, higher life expectancy, and a host of other realities that only one hundred years ago were non-existent. What was the common denominator in the development of each of these? It was research -- basic, pure, and applied, and done by people, the catalytic agent required to convert a ton of iron ore from the form in which it existed since the Earth began into high grade turbine blades for turbojet aircraft engines.

With this preoccupation on the development of material, natural resources into products, the research into the nature of the catalytic agent--man--lagged far behind until recent times. Man was always available in profusion so there was no real reason to worry about him. If one man couldn't do his required job, another could be located to replace him. If an occasional genius came along, like Sir Isaac Newton, Leonardo da Vinci, or Benjamin Franklin, progress was hastened thereby, but most of mankind was unenlightened by their or other similar work. Communications were poor, education was for the very few, and, besides, mankind was too busy scratching out a bare existence from the soil, forest, or sea to have enough time to engage in

much theoretical musings or analysis of what made men function as they did. Then came the Industrial Revolution and its attendant shifting of population from rural to industrial situations. Bodies to fill jobs became the need of the day, and these bodies were available in the forms of men, women, and children. Survival of the fittest became the way of life, with the more ruthless and shrewd and able people directing the lives of the less endowed. Managers, owners, and "bosses" as a class were pitted against workers as a class. Some of the former were enlightened inherently and were able to operate successful businesses or industries while their employees enjoyed working for them. Others operated successfully while they drained their employees' energies and services to the detriment of health and life itself, while paying the least possible wages, using economic pressure and the threat of summary dismissal to hold their employees. Men were plentiful; machines were not. Men were cheap; machines were not.

Then, toward the end of the Nineteenth Century, realization came to some more advanced leaders of industry that people were important, too. By 1911 Frederick W. Taylor, "the father of scientific management", wrote:

There is another type of scientific investigation which ... should receive special attention, namely the accurate study of the motives which influence men. At first it may appear that this is a matter for individual observation and judgment, and it is not a proper subject for exact scientific experiments. It is true that the laws

which result from experiments of this class owing to the fact that the very complex organism--the human being--is being experimented with, are subject to a larger number of exceptions than is the case with laws relating to material things. And yet laws of this kind, which apply to a large majority of men, unquestionably exist, and when clearly defined are of great value as a guide in dealing with men...¹

Various sociologists, economists, and psychologists began to investigate limited areas of people employed in industry. Taylor, quoted above, and Frank W. Gilbreth, among other management specialists, sought means for increasing efficiency of manpower, placing of men best qualified for certain jobs, and other ways of furthering manpower organization, direction, and control. The advent of World War I went far toward spotlighting the need for research in the manpower field. Manpower resources began to become as precious as natural resources; profligacy and inefficiency in their utilization became a cause of concern. Since World War I, and especially during and after World War II, this concern has grown steadily, although, too, research into the area has become more and more a standard practice. Especially today, with the Western nations vastly outnumbered by the manpower resources of the Soviet Russia-dominated nations, it is vital that our productive output per man or woman be maximized. This is true whether that productive output be in the field of machine and tool design, research into nuclear phys-

¹Frederick W. Taylor, The Principles of Scientific Management (New York: Harper and Brothers, 1934), p. 119.

ics, controlling cancer, directing the efforts of others, turning out parts on a machine tool, or whatever. Thus, one purpose of this study was to investigate manpower utilization and motivation in a Governmental activity.

A second reason for the study was to inquire into what the employees themselves think about their employment as Government workers. This was desired in order to get a qualitative comprehensive viewpoint concerning their group feelings toward their workplaces, their jobs, their supervision, their organization, and their plant. Thus, by getting and summarizing their opinions and correlating the over-all way they felt about these areas with various kinds of manpower and production records, it was hoped to establish a groundwork, or criterion, to which subsequent improvement or lack of it could be compared.

Finally, this study was conducted for the purpose of determining response differences among widely differing groups of people, and whether or not a questionnaire especially designed for a particular plant could be given successfully to all levels of employees, from top management down through all levels of the organization. On the basis of the tabulated replies, areas for possible management action might be pointed out. Thus, one Department's responses could be compared to those of the others, needs for certain desirable modifications might be delineated, and presently felt estimates of management as to what it be-

lieved were the summary of opinions of the personnel under them might be verified, or perhaps, shown in need of modification.

The Government production activity chosen for this study was the United States Naval Ordnance Plant, Indianapolis, Indiana. "NOPI", as the Naval Ordnance Plant, Indianapolis, is generally called, was selected because of the variety of employees comprising the activity, because of its proximity to West Lafayette so that frequent visits could be made, and because it is an activity under the Naval Bureau of Ordnance which has sponsored the writer's graduate education.

The Naval Ordnance Plant, Indianapolis

Description. NOPI is located on North Arlington Avenue in Indianapolis. It occupies 164 acres and extends from 16th to 21st Street. The manufacturing building, the main structure, is 920 feet long by 560 feet wide, and comprises 11½ acres of floor space. It is fronted by a three story administration building, and flanked by a cafeteria and a garage and maintenance paint shop; all these are part of the main single-roofed structure. In addition, a powerhouse, a research laboratory comprising 16,000 square feet of floor space, and various other smaller storage and warehouse buildings constitute the remainder of the activity's structures.

The research laboratory and main structure are air-conditioned throughout, giving constant temperature and humidity control. Both direct and indirect lighting is provided; the illumination level at each working space is about forty foot candles throughout the shop; more is provided for drafting room spaces.

To reduce fatigue and provide a vibrationless base for machines, the floor is constructed of six-inch reinforced concrete slab, with a two-inch hemlock sub-floor set in mastic covered with one and one-quarter inch maple. The ceiling is of Sanacoustic metal which has a noise reduction coefficient of approximately eighty-five per cent.

Locker rooms, complete with modern facilities for safe-keeping of the employees' belongings, are provided. Ample parking space is provided in the adjacent parking lot. The modern cafeteria has a seating capacity of 1,000. An up-to-date, well staffed dispensary is also provided.

To assist employees in present work and in preparation for more advanced positions, a modern technical library is maintained. More than 2,600 texts and bound periodicals and 36,000 pamphlets and military publications are on file, and 200 periodicals are received regularly. NOPI also uses inter-library loan service from other private and governmental activities.

Activities at NOPI are primarily centered about the development and production of more accurate and useful avi-

ation ordnance firecontrol instruments to keep abreast of the Navy's expanding need resulting from continued tactical research, armament and ammunition engineering, and the constant development of more advanced and faster aircraft. Firecontrol equipment and components are engineered to strict service performance requirements and specifications. At NOPI, mathematical expressions for solving various fire-control situations are developed and later mechanized to a fine degree of accuracy. Unlimited use of theoretical principles, mechanization methods, and materials is possible due to the diversified qualifications of the personnel.

Precision equipment of this type may require the completion of 1000 to 1500 drawings for detailed production plans. Special test equipment must be devised. Extremely high inspection standards must be devised and followed through. Component parts are delicate and easily damageable in handling; most pieces of equipment are composed of high-precision, light weight, small size sub-assemblies. Solder joints must be vibration-proof and have good conductivity. Typical tolerances maintained are about plus-or-minus three ten-thousandths of an inch, although considerable work must be done to one ten-thousandth. Finishes required average about thirty-two micro inches. NOPI is not in the conveyor belt, mass production type of business. The products are difficult to make, yet they must be made right, for life and national security depend on the quality of NOPI's

products.

Materials worked with include ceramics, all types of metals and alloys, plastics, chamois, fibre, and others. Some machines use tools only six-thousandths of an inch wide. The ratio of machines to men in the machining divisions is about 2.5 to 1. The employees must be not only skillful, but versatile in their knowledge of various machines and processes. The yearly product value runs about \$20,000,000. Figure 1. shows a frontal view of NCPI.

Organization. NCPI is operated by and for the Bureau of Ordnance, Department of the Navy. The Navy took over operation of the plant at the conclusion of World War II from the Lukas-Harold Corporation, a subsidiary of the Carl L. Norden Corporation. The plant was built in 1942 and operated under civilian management to produce the famed Norden Bombsight. Many of the management and other employees continued their employment under the Navy's management control. Thus, employees' lengths of service at NCPI vary from twelve years over-all to newly hired.

The organization is built upon the Navy's standard line basis. A regular navy line Captain heads the organization and under him is a Commander. Under these two top administrators come the heads of the various Departments. Thus, the Captain and Commander act as Plant Manager and Assistant Plant Manager, respectively. These two positions are rotated every two or three years, the incumbents going to



FIG. 1 FRONTAL VIEW OF NOPI

sea or other shore duty with other officers from sea duty or other shore duty replacing them. The officers are selected carefully for these positions, and their qualifications include, usually, special industrial training and practical experience in the Bureau of Ordnance or other Bu-Ord activities along administrative lines, as well as demonstrated ability to command at sea.

The Department Heads, for the most part, are civilian Navy employees, although the Planning Office and the Medical and Supply Departments are headed by naval officers. The over-all breakdown of the organization below the top administrators is into three categories: (1) the staff group, (2) the mission supporting group, and (3) the mission accomplishing group. Figure 2 is the over-all organization chart for NCII.

The personnel employed at NCPI total a nominal three thousand and fifteen. The "mission accomplishing" or operating Departments were selected for this study; however, their close interrelationships with certain other Departments and Offices necessitated some liason and interviewing with representatives from Planning, Management Planning and Review, and Industrial Relations. The four Departments studied, with the number of personnel employed in each, were as follows:

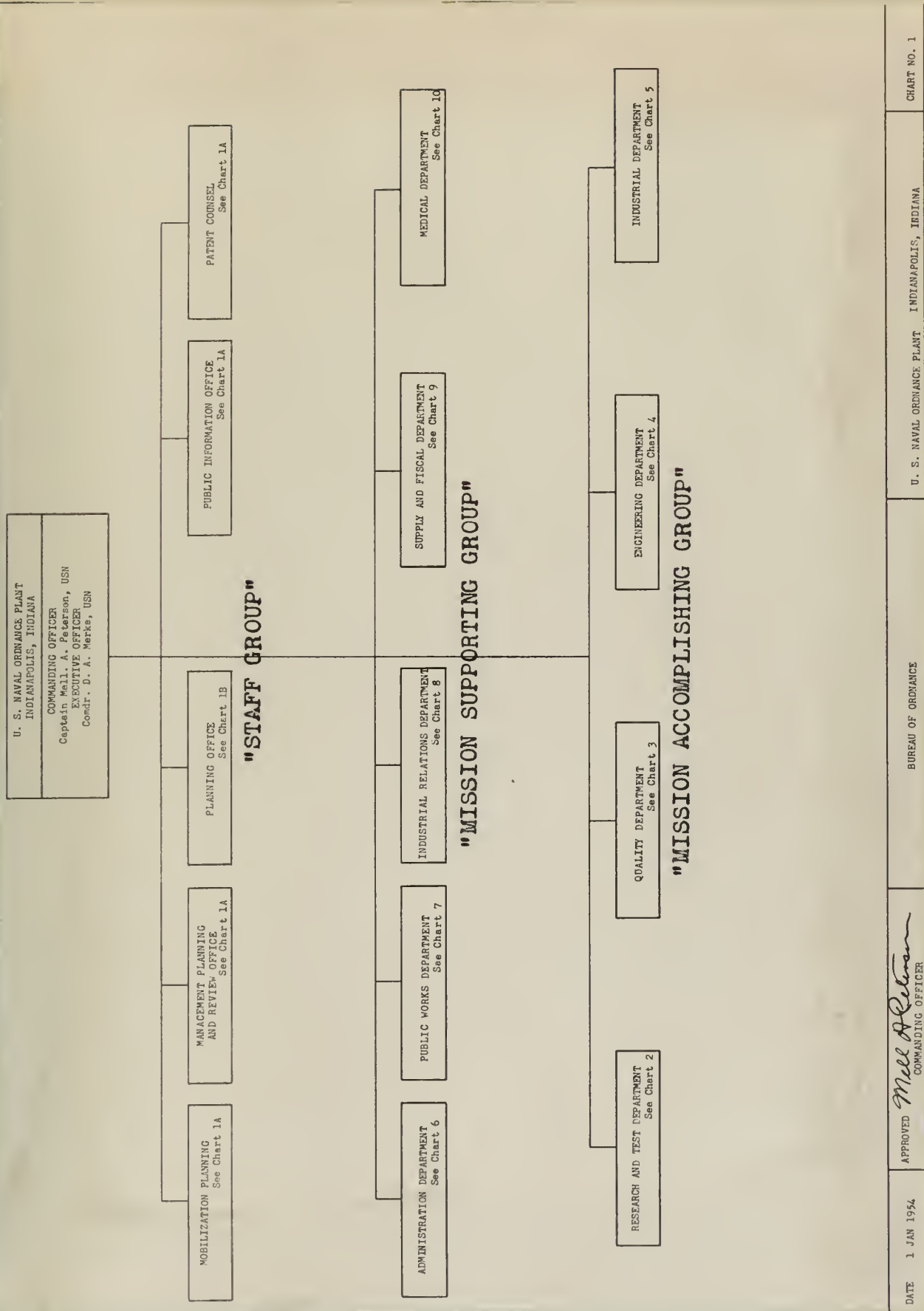


FIG. 2. NOPI OVERALL ORGANIZATION CHART

Department	Number of employees	
	Per Annum ²	Per Diem ²
Engineering	310	55
Quality	91	25
Research and Test	98	20
Industrial	140	142
Totals	642	1669

For a functional description of what each of these Departments does, see Figures 3 through 9. The Departments are further divided into Divisions, Branches, and Sections for administrative purposes.

Mission. The Mission of the Naval Ordnance Plant, Indianapolis is to:

²The descriptive terms, "per annum" and "per diem" are in general use, if improperly. Per Annum refers to employees filling positions under the Classification Act of 1923, revised and superceded by the Classification Act of 1949. The employees in this category are also called "white collar" or "graded" workers, and they are paid yearly salaries. Per Diem, on the other hand, refers to those workers who occupy positions which are not within the provisions of the Classification Act of 1949, but who have their wages set by an Area Wage and Classification Office, and who are now generally paid hourly rates although they formerly were paid by the day. The other synonyms for per diem workers are "ungraded" or "wage board" or "blue collar" workers. Per diem employees are paid the going hourly rate for similar trade, craft, machine operator, laborer, helper or supervisory jobs of these categories paid by private industry in the general area, as determined by yearly survey and adjustment. Per annum employees' salaries are fixed according to their classification, and only Congressional action can change them. Periodic step increases are provided on a longevity basis within the grade. Step rates are also applied within the job areas of the ungraded workers. A fourth step ordinance man, for example, would be paid a higher hourly rate than a third step ordinance man, and so on. On 25 January 1954 the steps for ungraded workers were cut to a total of three: the fourth step people were frozen at that wage, and no further advances to fourth step are authorized. The fourth step will be abolished completely in 1955.

OPERATING DEPARTMENTS

RESEARCH AND TEST DEPARTMENT See Chart 2
<p>The Research and Test Department has the responsibility of performing research in aviation fire control theory and technology and of providing laboratory test facilities and analytical service to other departments. The responsibilities include the development of experimental working models of fire control components and systems and simulated operational and environmental tests on experimental and production models for technical evaluation and type approval.</p> <p>This Department is organized in five divisions, namely, Mathematics, Physics, Design and Test, Materials, and Technical Services.</p>

QUALITY DEPARTMENT See Chart 3
<p>Responsibilities are: The inspection and maintenance of quality standards as specified or interpreted by the Engineering Department of all materials received, processed and shipped by the Naval Ordnance Plant, Indianapolis.</p> <p>The Quality Department consists of two principal divisions: Statistical Quality Control Division. Inspection Division.</p> <p>The SQCD specifies type and amount of inspection to be performed. Prepares classification of defects, acceptance inspection instructions, and establishes visual comparative standards. Establishes and maintains quality indices and evaluates product quality. Designs experiments, and performs statistical and mathematical analysis on troublesome problems. Investigates, analyzes and reports on problems which affect quality of end product. Grants and denies waivers on parts assemblies, etc. which deviate from specifications.</p> <p>The Inspection Division has the responsibility for the acceptance of all products received and processed in this Naval Ordnance Plant in accordance with all existing specifications, and to determine that all finished products meet the required acceptance tests and are of good workmanship and will function satisfactorily under extreme service conditions.</p>

ENGINEERING DEPARTMENT See Chart 4
<p>The Engineering Department is charged with the responsibility for the: Development and design of airborne and other fire control gear including radar, and the preparation and release of technical information.</p> <p>Technical direction and service in the phases of manufacture, test, packaging, installation, operation, maintenance and overhaul of fire control equipment, including radar and other associated gear.</p> <p>Prepare associated technical information.</p> <p>This Department is composed of six divisions: Development Division Design Division Engineering Services Division Maintenance & Production Div. Test Devices Division Radar Division</p>

INDUSTRIAL DEPARTMENT See Chart 5
<p>Responsibilities are as follows: Fabrication, assembling, calibration and testing of fire control instruments, radar and other related equipment assigned to NPOI for manufacture, overhaul and alteration.</p> <p>Production of ordnance parts, components, ordals, etc., for field installation and for replenishment of the stock system.</p> <p>The performance of experimental work involved in the development of new fire control instruments and related equipment.</p> <p>Production of tools and testing equipment used at NPOI and in the field for the maintenance repair and calibration of fire control equipment.</p> <p>Development and maintenance of complete production data for each item of manufacture, suitable for immediate use by other activities in emergency.</p> <p>Screening, cataloging and storing of production tooling and other equipment, used in the manufacture of fire control instruments, acquired by the Bureau of Ordnance as a result of contract terminations.</p> <p>Estimating of all production tasks for budgeting and plant scheduling purposes, production with delivery dates, preparing periodic reports reflecting the status of tasks in process.</p>

APPROVED *Mill Stevenson*
COMMANDING OFFICER

DATE 1 JAN 1954

BUREAU OF ORDNANCE

U. S. NAVAL ORDNANCE PLANT, INDIANAPOLIS, INDIANA

CHART 1B (FUNCTION)

FIG. 3. OPERATING DEPARTMENTS, FUNCTIONAL CHART

QUALITY DEPARTMENT

INSPECTION DIVISION

The Inspection Division has the responsibility for the acceptance of all products received and processed in this Naval Ordnance Plant in accordance with all existing specifications, and to determine that all finished products meet the required acceptance tests and are of good workmanship and will function satisfactorily under extreme service conditions.

STATISTICAL QUALITY CONTROL DIVISION

The Statistical Quality Control Division is responsible for the development and establishment of statistical and other techniques designed to maintain control over the quality of material purchased, processed and shipped by the Naval Ordnance Plant, Indianapolis. This function includes the training of plant personnel in the employment of statistical techniques in the control of product quality.

RECEIVING AND PARTS INSPECTION BRANCH

The Receiving Inspection and Parts Inspection Branch is charged with the responsibility to determine that all products received at this Naval Ordnance Plant are in accordance with specifications and in full compliance with the Vendor contracts.

The Parts Inspection function of the Receiving and Parts Inspection Branch is charged with the responsibility to determine that all parts that are processed and/or fabricated at this Ordnance Plant are in accordance with specifications and are of good workmanship and satisfactory for service requirements. The Process Inspection function of the Receiving and Parts Inspection Branch is to determine that all parts are in accordance with specifications during the process of fabrication in the Machining Division.

FINISHED PRODUCTS INSPECTION BRANCH

The Finished Products Branch is charged with the responsibility to determine that all completed instruments and assemblies processed thru this Naval Ordnance Plant are in accordance with all specifications and are of good workmanship and satisfactory for use under extreme service conditions. This Branch performs all the functional tests as required on all instruments and assemblies prior to release for shipment.

QUALITY EVALUATION BRANCH

Evaluate quality of completed instruments, components, spare parts, purchased and fabricated items passing final inspection. Evaluate material in stock. Evaluate material returned from the field as defective. Evaluate adequacy of packaging methods and determine their length of effectiveness. Provide working facilities for design of experiments. Perform special investigations on defective material. Establish and report quality indices, i.e., inspection performance and over all product.

CHARTING AND SAMPLING TECHNIQUES BRANCH

Prescribe location of inspection for purchased material, i.e. at source of supply or at NPI. Specify sampling inspection procedures for purchased and/or manufactured material. Review results. Provide liaison to Field Inspection Service relative to inspection and sampling techniques. Obtain replacements for all defective source inspection items. Specify amount of inspection relative to type and "special" requirements. Prescribe and utilize X and R control charts, pet charts, etc. Establish quality records for vendors. Establish records and prepare reports on sampling inspection results and performance of inmates. Acts as consultant to the Inspection Division regarding Sampling Inspection techniques.

STATISTICAL OPERATIONS BRANCH

Investigate and assume responsibility for rejections in both machining and assembly. Perform special quality investigations. Recommend changes in production processing and assembly when advisable. Maintain history records of parts processed and assembled in production. Maintain history records of all ball bearing inspection reports and distribute weekly and quarterly analyses to management and to vendors. Authorize issuance or denial of waivers of Defects on all parts and material which deviate from specification.

QUALITY SPECIFICATIONS BRANCH

Prepares NAVORD Classification of Defects for electrical and mechanical parts, sub-assemblies, and assemblies of fire control instruments and systems. Prepares Interim Acceptance Inspection Instructions for fire control instruments and systems where design information is incomplete and/or preliminary. Prepares final Acceptance Inspection Instructions for fire control instruments and systems where design has been stabilized and approved. Develops, devices, and prepares for use in the inspection evaluation of acceptability of fire control systems and fire control components comparative standards covering visual defects which cannot be adequately defined verbally or by drawings.

DESIGN OF EXPERIMENTS BRANCH

Design experiments. Furnish statistical counsel for plant, bureau, vendor, personnel. Develop statistical techniques. Research into plant problems. Prepare procedures. Supervise sampling and experimental techniques. Analyze procedures mathematically. Analyze test results statistically. Offer departmental consulting services. Prepare displays, training programs, etc.

DATE JAN 1 1954

APPROVED

Wm. A. Peterson
COMMANDING OFFICER

U. S. NAVAL ORDNANCE PLANT, INDIANAPOLIS, INDIANA

INSPECTION DIVISION

CHART NO. 3
(FUNCT)

FIG. 4. QUALITY DEPARTMENT, FUNCTIONAL CHART

ENGINEERING DEPARTMENT

MAINTENANCE & PRODUCTION DIVISION	
The Maintenance and Production Division (E-940) is responsible for:	
(a) Development of prototypes on equipment created by outside activities and manufactured at NOPI	
(b) Engineering cognizance of all repair and overhaul activities at NOPI including radar equipment.	
(c) Product engineering of equipment designed by outside activities and manufactured at NOPI.	
(d) Product engineering on parts and sub-assemblies manufactured for Navy Stock System.	
(e) Installation and field service on equipment.	

DEVELOPMENT DIVISION	
The Development Division (E-910) is responsible for:	
(a) The development of technical information into and through the experiment and pre-production model versions of end product fire control equipment, preceding product design, including the preparation of preliminary performance specifications.	
(b) Studies of unusual engineering problems arising from the development of air- borne fire control equipment directed toward a practical solution.	
(c) Liaison with laboratories, institutions or other organizations similarly engaged, including the establishment of contractual obligations for development work.	

DESIGN DIVISION	
The Design Division (E-920) is responsible for:	
(a) All technical design functions requisite to the production of airborne fire control equipment, exclusive of fire control radar.	
(b) The preparation and release of designs and performance specifications in Bureau of Ordnance form.	
(c) Product engineering as required in the performance of the station's mission.	
(d) Technical supervision of production under outside contracts of fire control equipments designed under the cognizance of this division.	

TEST DEVICES DIVISION	
The Test Devices Division (E-950) is responsible for:	
(a) Determining and specifying all tests that are to be performed to assure the correct functioning of complete fire control instruments, components and purchased part..	
(b) Developing, designing and covering on Bureau of Ordnance Shop Accessory drawings all test instruments and test equipments needed to accomplish (a) above.	
(c) Coordinating the requirements for all test instruments and test equipments so that instruments and equipments will be available when needed for the various production projects.	
(d) Developing, designing and covering on Bureau of Ordnance Shop Accessory drawings all special test sets, calibration fixtures, etc. required for field service use.	

ENGINEERING SERVICES DIVISION	
The Engineering Services Division (E-930) is responsible for:	
(a) The preparation of technical publications for equipment manufactured, repaired or overhauled at this station.	
(b) Technical services on materials, their use, processing and inspection.	
(c) Complete drafting, photographic, reproduction, and record services; this includes process photography such as line negatives, half-tone negatives, instrument name plates, silk screens, etc., as well as photographic work on life and still subjects.	
(d) The preparation and distribution of engineering and manufacturing standards.	
(e) Complete model shop services.	
(f) Instrument serial numbers, cognizance of.	
(g) Ballbearing, handling and control of.	
(h) Preservation and Packaging design and specifications for all equipment produced or overhauled at NOPI.	

RADAR DIVISION	
Radar Division (E-960) is responsible for:	
(a) Development and design of Radar Fire Control Systems and components including such systems as Air to Air and Air to Ground Fire Control Radars and Universal Systems for Search and Fire Control. Components of Radar Systems developed include: Antennae, Transmitters, Modulators, Receivers, Synchronizers, Range Units, Indicators, Power Supplies and associated Junction and Control Boxes.	
(b) Development of techniques to improve the performance or design of airborne fire control radar equipment.	
(c) Evaluation of Fire Control Radar Systems developed including liaison for field flight tests of airborne equipment.	
(d) Development and design of Radar Training and Fire Control Aids.	

DATE 1 JAN 1954

APPROVED

Will A. Peterson
COMMANDING OFFICER

U. S. NAVAL ORDNANCE PLANT, INDIANAPOLIS, INDIANA

ENGINEERING DEPARTMENT

CHART 4
(FUNCT.)

FIG. 5. ENGINEERING DEPARTMENT, FUNCTIONAL CHART

RESEARCH AND TEST DEPARTMENT

MATHEMATICS DIVISION
<p>Serves as an authority on the mathematical and statistical theories of the aviation fire control problems and fire control systems. Conceives, plans, coordinates, and executes continuing mathematical and statistical research and its application to the design, development, and evaluation of aviation fire control systems. Conducts foundational research in the field of applied mathematics and associated theoretical fields.</p> <p>Provides mathematical analysis services to other Departments for the solution of specific design problems.</p> <p>Operates both large scale electronic and automatic electrical calculating equipment which may be numerical or graphical.</p> <p>Operates data reduction and analysis equipment.</p>

PHYSICS DIVISION
<p>Reduces mathematical theories and equations governing airborne fire control systems to mechanical form consistent with existing or attainable physical components.</p> <p>Devises methods of mechanizing aviation fire control theory for the design and development of particular systems.</p> <p>Conceives new systems utilizing latest developments in theory and equipment for airborne fire control.</p> <p>Devises, builds, and uses equipment for the dynamic analysis of components and systems under simulated combat conditions.</p> <p>Performs research in the field of servomechanism design and filter design.</p> <p>Performs theoretical and experimental analyses of performance to be expected from systems proposed at this station and elsewhere.</p> <p>Calculates and experimentally verifies airborne fire control system design data for particular installations under specified tactical conditions (Calibration of systems).</p> <p>Advises other Divisions and Departments concerning basic physical requirements to be met in the design and production of equipment.</p>

DESIGN AND TEST DIVISION
<p>Develops mechanizations and associated components by the design and construction of working models of experimental aviation fire control equipment, for test and evaluation.</p> <p>Devises and develops methods of performing mathematical computations by analog and digital means.</p> <p>Performs tests to determine the characteristics of own experimental models and new components, developed by others, of aviation fire control equipment, including the design and construction of special test devices involved therein or required by the Laboratory.</p> <p>Performs official type tests for the Quality Department and tests and evaluates prototypes for the Engineering Department.</p> <p>Tests and evaluates radar for use in own aviation fire control systems developmental programs.</p> <p>Performs tests on airborne electronic components and systems for technical evaluation of operational serviceability and reliability.</p> <p>Also performs type tests for Bureau on equipment under its direct cognizance.</p> <p>Operates Temperature-Altitude Test Chamber when used as a test facility by personnel of other departments.</p> <p>Operates tool and instrument crib for departmental use.</p>

MATERIALS DIVISION
<p>Investigates and develops new or improved materials and processes for use in the research, development, engineering and production tasks assigned to the station. Furnishes necessary technical data for specifications on newly developed materials.</p> <p>Performs acceptance tests on incoming materials and castings for the Quality Department to determine compliance with specifications.</p> <p>Provides X-ray diffraction, radiographic, spectrographic, metallurgical, chemical, optical and physical testing services.</p> <p>Provides analytical, advisory and consulting services to other departments regarding selection, specifications, substitution or processing, of materials.</p> <p>Conducts research and development work on optically thin films and writes specifications. Devises and conducts tests on optics. Produces optical coatings by high vacuum technique for production.</p> <p>Performs routine analytical and advisory services for various plant activities for process control such as plating, heat treat, and boiler feed water.</p>

TECHNICAL SERVICES DIVISION
<p>Supervises the Department stenographic pool.</p> <p>Operates the Department filing system.</p> <p>Handles all routine personnel forms and records.</p> <p>Maintains time distribution records, equipment inventory and project expenditure records.</p> <p>Furnishes assistance in procurement problems.</p> <p>Prepares budget cost estimates and reports with the advice of other division heads when involved.</p> <p>Initiates all work requests for maintenance of building and repair of equipment.</p> <p>Provides reproduction services for other Research Divisions.</p> <p>Handles issue of office furniture and equipment for department.</p>

DATE 1 JAN 1954

APPROVED *W. L. Ritten*
COMMANDING OFFICER

U. S. NAVAL AIRCRAFT PLANT, INDIANAPOLIS, INDIANA

RESEARCH AND TEST DEPARTMENT

CHART NO. 2
(Funct.)

FIG. 6. RESEARCH & TEST DEPARTMENT, FUNCTIONAL CHART

INDUSTRIAL DEPARTMENT

PRODUCTION DIVISIONS 201
See Chart 5A

Designs, builds and maintains all special tools and gages used in the fabrication of parts as well as complete instruments.

Manufactures and assembles all parts and components required for aircraft fire control systems and related instruments, and calibrates them to specified performance characteristics.

Repairs, modernizes, and recalibrates shipborne as well as airborne and underwater type of fire control instruments.

Salvages and utilizes parts and components rejected during manufacture.

Acts as consultant to entire plant on all matters pertaining to tooling and special production techniques.

INDUSTRIAL CONTROL DIVISIONS
202 See Chart 5A

Plans for and controls all manufacturing facilities. Determines which parts or assemblies thereof shall be purchased or manufactured; provides raw materials, tools, specific manufacturing instructions and production schedules.

Maintains machines and methods charts to determine type of work to be subcontracted if overloaded or type of work required if underloaded. In event of underload, informally contacts Hurd or other government agencies to effect transfer of additional work to NOPY. If overloaded, selects work to be subcontracted and stub requisitions through Supply Department giving suggested source of purchase.

Maintains checks to eliminate production delays and bottlenecks; moves, stores and disposes of all manufactured items. Provides estimates on proposed productive work and detailed standards of time for specific manufacturing operations. Acts in advisory capacity to the Engineering Department in connection with product design for economical manufacture. Plans and recommends the allocation of plant floor space, the selection, procurement and arrangement of production equipment, disposition of surplus equipment and executes special assignments.

DATE 1 JAN 1954

APPROVED

Melvin H. Coleman
COMMANDING OFFICER

U. S. NAVAL OREMANANCE PLANT, INDIANAPOLIS, INDIANA

INDUSTRIAL DEPARTMENT

CHART NO. 5
(FUNCT)

FIG. 7. INDUSTRIAL DEPARTMENT, FUNCTIONAL CHART

PRODUCTION DIVISIONS

ASSEMBLY DIVISION 230

Assembles fabricated parts into complete functioning aircraft fire control and related instruments, and calibrates these to specified performance characteristics.

Repairs, modifies, modernizes and realigns instruments as well as aircraft type fire control instruments.

Constructs special electrical test devices used for calibration and inspection of manufactured instruments.

Overhauls and modernizes radar equipments of all types.

MACHINING DIVISION 220

Completely fabricates all parts required for the assembly of equipment produced on the station and for use in the field for spares.

Acts as consultant to the Industrial Control Divisions and the Engineering Department when special production techniques must be developed.

TOOLING DIVISION 240

Designs, builds, and maintains all special tools and gages used in the fabrication of parts and in the assembly of components as well as complete instruments.

Procures and issues all perishable tools, miscellaneous shop accessories and shop supplies.

Acts as consultant to the entire plant on all matters pertaining to tooling.

Reclaims defective material, parts and components rejected during the course of manufacture.

Culls all rejected and surplus material for items or components of value.

INDUSTRIAL CONTROL DIVISIONS 202

PRODUCTION CONTROL DIVISION 200

Provides broad production planning, schedules and requisitions raw materials and commercial items; schedules and issues shop orders for all local manufacture; day to-day dispatching of all productive work; expedites procurement and manufacture of all items in accordance with scheduled dates; intra-plant movement of all materials in process of manufacturing; stocks and issues all "in manufacturing process" materials; correlates and reports on work measurement program for the Industrial Department.

SPECIAL PROJECTS DIVISION 250

Directs, coordinates and expedites special projects which require out-of-routine handling; provides technical liaison between the Industrial Department and other departments and private industrial organizations regarding special projects or assignments; provides technical advisory assistance to other industrial department organizational segments upon request.

MANUFACTURING METHODS DIVISION 250

Determines how each production job is to be performed; conducts pre-production evaluation of manufacturing processes in methods development work shop; requisitions tools, gages and test equipment; estimates project labor and material costs; provides technical advice on manufacturing problems; receive, store, record movement of and distributes all engineering data issued to the Industrial Dept; recommend procurement of new production equipment; evaluate all beneficial suggestions affecting production; cognizant division on all matters pertaining to material handling within the Industrial Department.

INDUSTRIAL FACILITIES DIVISION 280

Plans and recommends the allocation of plant floor space; the selection, procurement and arrangement of production equipment; the disposition of surplus equipment and facilities; maintains machine tool inventory record; evaluates new production processes and equipment; assists other departments on layout plans and equipment selection; executes special assignments not within the scope of any other functional group of the Industrial Department.

W. A. R. R. R.
COMMANDING OFFICER

DATE 1 JAN 1954

APPROVED

U. S. NAVAL OFFENSE PLANT, INDIANAPOLIS, INDIANA

PRODUCTION DIVISIONS

CHART NO. 5A
(FUNC)

FIG. 3. PRODUCTION AND INDUSTRIAL CONTROL DIVISIONS, FUNCTIONAL CHART

Design, develop, product engineer, manufacture, assemble, inspect, test, distribute, modify, overhaul and maintain aviation and medium or small size control equipment and other ordnance material as directed. Prepare, revise, stock and issue manuals for the above types of equipment and material as directed by the Bureau of Ordnance. Develop and apply statistical quality evaluation techniques in accordance with Bureau of Ordnance directives. Overhaul and repair all types of synchros. Perform supporting services to aviation activities and other activities performing aviation ordnance installation work as authorized by the Bureau of Ordnance. Perform the functions of a Secondary Stock Point in the Ordnance Supply System and the functions of a Ready Issue Point in the Aviation Ordnance Supply System. Provide drawings and manufacturing data to Ordnance Establishments and such manufacturers as may be directed by the Bureau of Ordnance.³

Navy Civilian Personnel Instructions. As U.S. Navy Regulations, 1948 is to the naval officer or enlisted man, so Navy Civilian Personnel Instructions are to civilians employed by the Navy Department.

SECNAV [The Secretary of the Navy] INSTRUCTION 5430.7 of 20 March 1953 delegated to the Assistant Secretary of the Navy for Air the responsibility for matters concerning civilian personnel policy. The Office of Industrial Relations was placed under the immediate supervision of the Assistant Secretary of the Navy for Air.

Navy Civilian Personnel Instructions are issued in conformity with U. S. Navy Regulations, General Order No. 5, and SECNAV INSTRUCTION 5430.7 and therefore have full force and effect for the guidance of all persons in the Naval Establishment⁴

The primary function of the Office of Industrial Relations is to advise the Secretary of the Navy on all matters

³Quoted from a Bureau of Ordnance letter, "U.S. Naval Ordnance Plant, Indianapolis, Indiana; Mission of," dated 12 March 1954.

⁴Navy Civilian Personnel Instructions, Instruction 1, (Washington, D.C.: Navy Department, Office of Industrial Relations, 24 April 1953), pp. 1, 2.

pertaining to the administration of the civilian employees of the Navy, to prepare and recommend to the Secretary appropriate policies and procedures governing civilian employees, and interpret for civilian employees the policies of the Navy that directly affect them.

The purpose of the NCPI, as the Navy Civilian Personnel Instructions will hereinafter be referred to, is three-fold:

(a) To assure uniformity insofar as practicable, throughout the Naval Establishment in the application and interpretation of laws, executive orders, comptroller general decisions, and Navy Department policies and procedures relating to civilian personnel administration.

(b) To provide between two covers in simple codified form, in serial order, over-all instructions, policies and procedures required to be followed in the administration of programs under the general cognizance of the Office of Industrial Relations.

(c) To assure like treatment, right and obligations with respect to all civilian employees in the Naval Establishment. NCPI's conform to the guiding principles for the conduct of human relations in dealing with civilian personnel for the entire Department of Defense...⁵

NCPI comprises some forty-eight sections or chapters, loose leaf in form and numbered and titled by the subject matter contained. Taken collectively, they comprise the basic personnel policy under which NCPI operates.

Approach to the Study

Due to time and financial limitations, it was decided to limit the study to those areas bearing on the productive output of the Ordnance Plant. Use of an anonymous response

⁵Ibid., p. 2.

type questionnaire was decided upon. Originally, only the Industrial Department was intended for coverage, with analysis on the basis of Divisions within the Department. However, it became evident that certain persons could easily be identified if this system were used, due to the limited numbers of certain positions within various Divisions. Further, Management at NOPI was interested in polling a larger group of employees. Thus the plan evolved to submit questionnaires to all employees in the four operating Departments. More identification data was requested than could be analyzed in this study, although complete employee anonymity was assured. Then, by interviews throughout the Ordnance Plant and by inclusion of available records bearing on the productivity of employees at the general time that the study was made, it was desired to form a measuring base from which further continuing research could begin. The broad coverage and intensive effort involved was considered to be a challenge, although it is conceded that consolidation of the effort on a smaller segment of the entire program might have yielded more concrete, more immediately usable, results. Since no similar survey of employee opinion on as broad a scope had ever been conducted at NOPI,⁶ it was believed that at the very least,

⁶An employee opinion type Survey of Personnel Utilization was conducted at NOPI in 1952. This was a standardized fourteen question form, four of the questions being utilized for identification purposes in data analysis, the remainder asking the employee's opinion on how he felt he was being utilized, efficiency wise. The questionnaire was sponsored by the Departmental Civilian Personnel Division, Administra-

the opportunity for "bottoms up" communication by so many employees would have the value of allowing them to "blow off steam" and to let them know that NOPI management is concerned with what they think. On the other hand, results of such a study could very conceivably show the need for better policy promulgation, for better human relations training, and better ways and means for improving job methods and satisfaction, among other areas of concern to management. For example, causes of absenteeism, excessive fatigue, lack of essential information, lack of training, inefficient work methods, and contemplated resignations, all obviously affecting productivity, might be disclosed.

⁶(continued) tive Office, Department of the Navy. Designed for standardized use throughout the Naval Establishment, it was given both at the Bureau of Ordnance, Washington, D.C., and at NOPI. Both these tabulations showed that the employees at each place felt that their over-all utilization was ninety-eight per cent, approximately, of the Survey-defined one hundred per cent.

DESIGNING AND EXECUTING THE QUESTIONNAIRE

Source Material

A search through available records at the Bureau of Ordnance, Washington, D.C., failed to disclose any employee opinion questionnaires which were standardized and along the basic lines desired. The Survey of Personnel Utilization, referred to in footnote 6, was too limited in scope. However, information was received that the Naval Ordnance Laboratory, White Oak, Maryland, had conducted a survey along the general lines desired. Consultation with Mr. J. F. FitzGerald of the Industrial Relations Department at the Ordnance Laboratory proved very helpful. Mr. FitzGerald described the approach taken at the Laboratory, the design of their questionnaire, some of the pitfalls involved in their use of the poll, and the value which the Commanding Officer and other managerial personnel attached to their study. Two surveys, one in 1950 and one in 1952, had been conducted. As a result of the first one, certain weaknesses shown to be present in the organization were concentrated upon by the NOL management. The second poll showed highly significant improvements in the field of over all morale and especially in the field of supervisor relationships with employees. The most concrete result of this improvement was to cut the turnover rate by increasing the employees' job satisfaction with the resultant savings of time, training, money, and productive output inherent in a stable,

cooperative work group. The work done at the Naval Ordnance Laboratory therefore formed a helpful source of information for this study.

Another source of material for this project was contained in a report of an opinion survey conducted by the National Council of Western Electric technical employees among 5100 non-supervisory professional personnel. A brief plan of the survey and the results obtained were published in the technical employee periodical Council Compass⁷ and were considered as a possible means of comparison in some cases to the results obtained in the NCPI study, due to the fact that many of the employees to be polled at NCPI were in a similar job category.

Other general background sources included various studies conducted by Professor Joseph Tiffin of Purdue University and resumés of various questionnaire-type polls as reported in business and professional periodical literature and textbooks.

Scope of Study. More was desired from this study than merely an appraisal of employee attitudes, which, taken as a whole comprise morale.⁸ Important as morale determination is, the design of the present study was intended to reach

⁷Published by the Council of Western Electric Technical Employees, Newark, New Jersey. Vol. 9, No. 3, Oct.-Dec. 1953. pp. 1-7.

⁸See Dale Yoder, Personnel Principles and Policies (New York: Prentice-Hall, Inc., 1952), p. 366, et seq.

more deeply into the NCFI employment atmosphere and to locate areas bearing directly or indirectly upon productivity. Productivity has been defined in various ways; one of the best ones the writer has located is: "Productivity is the record of the number of units produced per unit of time and production is merely a record of units produced. Productivity can further be thought of in terms of how big is the result of your effort and not in terms of how hard you work."⁹ Another concept along similar lines is: "Productivity unit is a measure of the rate of production, commonly designated as productivity, by indicating an improvement or recession in industrial effectiveness. That is, it is an indication of technological change."¹⁰ The foregoing will be the concepts of productivity in this paper.

Now, it is obvious that an almost endless number of factors affect employees' rates of output. Among them may be listed the following:

- Absenteeism
- Tardiness
- Type of work performed, working conditions and environment
- Motivation
- Selection for and placement on the particular job
- Inherent ability
- Training
- Availability of work

⁹Quoted from an address delivered before the 1953 Purdue University Industrial Engineering Conference by Mr. Q. N. Groth, Supervisor of Methods and Plant Layout for TAFCC Division, Thompson Products Company.

¹⁰L. P. Alford and H.R. Beatty, Principles of Industrial Management (New York: The Ronald Press Company, 1940), p. 752.

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Method of approaching and doing particular job
Skill in applying job methods
Fatigue
Personality
Physical fitness

Not so obvious, but perhaps significant factors may include the following:

Job security
Job satisfaction
Wage or salary level
Attitudes toward supervisors, management, and Company
Patriotism
Loyalty
Attitudes toward fellow employees
Status in the organization
Recognition in the job situation
Domestic relations
Community relations
Employee benefits available

Dale Yoder states:

"Morale" is the term most frequently used to describe employee attitudes toward their jobs, employer, and fellow employees. If such attitudes are favorable--if the employee likes his job, his employer, and his colleagues in the organization--his morale is said to be high. If employees dislike jobs and associates and working conditions, morale is said to be low....

High morale is not always associated with high levels of output.¹¹

In other words, the general assumption that high morale or favorable employee attitudes are directly and closely related to productivity may or may not be true in a specific organization. For example, two studies, at least, have shown an inverse relationship between employee satisfaction

¹¹Yoder, Op. cit., p. 345.

and productivity.¹² In the study of the railroad workers, the inverse relationship was statistically significant, while in the study of office workers it was not. Indeed:

The complexity of the relationship between satisfaction and productivity can not be overemphasized. The most productive workers are the ones who have the strongest needs for which productivity is a path (other things being equal). Under conditions where there is little tension-reduction or environmental return, these people will be the best workers and the most dissatisfied. (They will also, however, be probably looking around for another situation where the "behavior cost" for tension-reduction is not as high.) Under conditions of high environmental return, these people will be the best workers and the most satisfied.¹³

In the present study, however, it was decided not to devote attention too strongly to the relationship between morale at NCPI and the productivity relationship. Rather, in this basic broad study, attention would be directed more generally to some of the previously listed factors bearing on productivity. Certain questions would be included that would determine the general job satisfaction level in the selected Departments. They would be available for comparison among the four Departments and for possible management action in indicated areas. Some of the questions asked the employees would concern areas where their opinions and experience, in general, would be helpful in determining their

¹²D. Katz, G. Gurin, et al., Productivity, Supervision and Morale Among Railroad Workers (Ann Arbor: University of Michigan, 1951), and D. Katz, N. Morse, et al., Productivity, Supervision and Morale in an Office Situation (Ann Arbor: Survey Research Center, 1950).

¹³Nancy C. Morse, Satisfactions in the White Collar Job (Ann Arbor: Survey Research Center, 1953), p. 127.

productivity level, and those areas believed to be in need of improvement in order to increase employee effectiveness in the organization. It was necessary to limit the scope of the questionnaire proposed to the following main categories:

1. Identification data for opinion summary analysis.
2. Communication media and effectiveness.
3. Job satisfaction.
4. Supervisory ability and relationships.
5. The Navy Employees Beneficial Suggestion System.
6. Promotion opportunities and policies.
7. Industrial engineering and relations area bearing on productivity.

Weaknesses and Strengths of the Questionnaire

Probably the best method for conducting an objective scientific study of productivity is exemplified by the classical Hawthorne studies conducted at Western Electric by Elton Mayo. Here variables were controlled as closely as humanly possible and changed a few at a time so that the effects could be noted. Careful, complete records were kept of production, engineering changes, and of social and physiological changes in the employees. The experiments consumed years of time and many thousands of dollars; however, their results justified the effort expended. Most surveys cannot use this type of approach, however desirable it may be from the standpoints of objectivity in separating facts from sentiment, bias, and prejudice. Another approach to a survey is a careful analysis of personnel records, production records, and so on. This requires a slow, methodical

approach and limits the number of employees who can be studied in a given time unless carefully designed and maintained records can be put through automatic calculating machine systems. The interview is another widely used method of survey and analysis. Here, again, is a slow and expensive process. It is also subject to lack of training on the part of the interviewer in interpretation and recording results, to possible bias in weighting disclosed information, and other weaknesses.

Strengths of the Questionnaire Method. The questionnaire method of assembling employee data is the easiest, relatively, to administer. Further, it permits covering the largest number of people for the least cost. Moreover, it permits the greatest number of employees to give voice to their problems and dissatisfactions. Better than the interview, it makes coverage of specific items possible in a reasonably uniform manner. By inclusion of adequate space either within the questionnaire or at the end, areas not covered by specific questions can be communicated by the employee. Finally, its use permits complete anonymity of the employee, so that an atmosphere of freedom from any possible reprisal ensues.

Weaknesses of the Questionnaire Method. The area covered by a specific questionnaire might not be the one primarily needing coverage. The write-in space provided helps to overcome this disadvantage. Another possible weakness is that not enough replies will be received to fairly repre-

sent the employees polled. The language barrier inherent in written communication is present; what certain words mean to one person may mean something entirely different when interpreted by another. Insincere or "practical joker" type respondents, if present in large enough numbers, can throw off the results of a questionnaire and remain undetected among the answering employees who may check the same responses and believe in them. The alternative answers in a questionnaire may not provide for exactly the way the employee feels about a certain query. These are representative of possible weaknesses, although not an exhaustive listing.

The NOPI OPINION Questionnaire

In the actual design of the questionnaire, the above strengths and weaknesses were considered throughout. Due to observation and interviews, and despite misgivings on the part of some of the upper-level management personnel,¹⁴ it was believed that the employees would cooperate in returning their opinion ballots and that there would be a minimum of insincere returns. Copies of the proposed questionnaire

¹⁴This expression of questioning the validity of results is not peculiar to NOPI's management by any means. For example, in the Industrial Relations Handbook, 2nd Edition, (Chicago: The Dartnell Corporation, 1944; J. C. Aspley and Eugene Whitmore, editors), it is stated on page 513 that:

It is a common complaint of management that attitude surveys are both silly and useless because workers will not state their opinions honestly or fairly or reasonably This is the reason for complete anonymity in conducting the surveys.

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were circulated among top level administrators of the Departments concerned, to the head of the Industrial Relations Department, and to the Commanding and Executive Officers for comments, additions, deletions, or recommendations. The proposed questionnaire was also discussed at length with the President of Local 1949, International Association of Machinists (better known as District 44 of Government Workers).¹⁵ This discussion was for the purpose of acquainting the union president with the purpose of the questionnaire, to let him express any criticisms or suggestions, and, mainly, to put him in a position to answer any questions raised by members of the union concerning the questionnaire. Since no substantial exceptions or changes resulted from their examination of the proposed questionnaire, minor changes were made, wording clarified, and sample copies were run off, this being the fourth over-all revision of the content and wording of the questionnaire.

Representative employees were designated by Department Heads of the four groups to be studied to "try out the questionnaire". A letter explaining the purpose in taking

¹⁵ An undisclosed number of machinists belong to this union at NCFI. They sign a no-strike pledge and have no formal contract; management meets with union representatives the same way it meets with any other recognized representatives from employee groups. As long as it is determined that the group exists, no list of membership is required; hence whether only a handful of employees are union members or whether their membership constitutes a majority of eligible employees is not pertinent. NCFI 60 covers in detail the procedures for dealing with all forms of employee (group) relations.

the sample OPINION was promulgated by the Commanding Officer to each of these employees. A longer explanation was presented the group by the writer, and emphasis was placed on the idea that if any questions weren't clearly worded, or were not worded in accordance with their NCPI experience and usage, to bring them out. Besides the wording used, any other comments were welcomed and solicited which would encourage participation and interest. The general purpose of the Survey was made known to these employees. A total of thirty-three men and women participated in this sample ballot, ranging from Division and Branch Heads and high level ungraded employees' supervisors through representative levels in each Department. As a result of the sample poll, several valuable criticisms were received although some were beyond the scope of the survey; certain questions were made less ambiguous and wording corrected and improved; and, within its content limitations, the poll was endorsed by the representative employees.

The Actual Questionnaire. Figure 9 is one of the finished OPINIONS. Factors reflected in the final printed version include the following:

1. Multiple choice type responses, more difficult to tabulate than simple yes-no answers, but giving more emphasis to gradations in opinion and therefore a fuller appraisal in the area of the question asked.

2. Placement of unfavorable type response phrases

NAVY DEPARTMENT
U. S. NAVAL ORDNANCE PLANT
INDIANAPOLIS 18, INDIANA

IN REPLY PLEASE REFER TO.

23 February 1954

MEMORANDUM

From: Commanding Officer
To: Research, Engineering, Quality & Industrial Department Employees
Subj: Employee Opinion

1. In conjunction with a Navy graduate student's research project at Purdue University, I am interested in knowing what you think and how you feel about NOPI. Information of this kind may be helpful in making NOPI a better place to work. Furthermore, it offers you the opportunity to express your views concerning your job and other areas of interest to you in your employment here. The quickest and most thorough medium for collecting this information is by means of a survey of individuals.
2. The enclosed questionnaire is part of a survey being conducted at the plant. For it to be successful, your full cooperation is necessary. Please note that there is no possible way to identify any individual answering this questionnaire. Do not sign your name, please. It is in the over-all results of group opinions that we are interested. Your individual replies help to form this group opinion. You are requested to fill out this questionnaire and place it in a sealed "ballot box" promptly. The Purdue graduate student conducting this survey will pick up the locked boxes and take them to Purdue University for tabulating and analyzing. NO SUPERVISOR OR OFFICER AT NOPI WILL EVER SEE YOUR OPINION, it will be kept strictly confidential. The results will be shown in summary form and will be made known to all of us when the study is completed.
3. Please fill out this questionnaire at the time designated by your Department Head and fold and place it in the enclosed envelope; then drop it in the Employee Opinion Ballot Box most convenient for you. Boxes will be located in several places near where you work. One will also be put near the entrance to the cafeteria. The boxes will be removed to Purdue at 1600 on Thursday, 11 March, so be sure your ballot is in before that time!
4. We need your ideas, opinions, suggestions, and experience. We do not need your name. Your answers will be treated with utmost confidence. We request your participation in this Opinion and Information Survey. No matter what your job is, from Department Head on through all other levels, we want your frank and honest answers in order to improve methods, communications, policies, and our output ability at NOPI. Space is provided at the end of the questionnaire for any additional comments you may care to make; please feel free to use it.
5. Your cooperation in taking part in this Employee Opinion is appreciated.

Mell A. Peterson
MELL A. PETERSON

NAVAL ORDNANCE PLANT, INDIANAPOLIS

EMPLOYEE OPINION

WE WOULD APPRECIATE YOUR HELP

The Management of NOPI is very anxious to do everything in its power to make this Ordnance Plant an even better place for you to do your work. In order to do this, they must know what needs to be done. YOU are the one who can help. This form gives YOU the opportunity to express YOUR feelings and ideas about YOUR job and how YOU do it, YOUR supervision, and YOUR Ordnance Plant in general.

Please answer the following questions by placing a check (☒) in the space in front of the statement that most nearly agrees with how you feel and what your experience has been.

POINTS TO KEEP IN MIND:

1. YOUR ANSWERS WILL BE KEPT CONFIDENTIAL. Do not sign your name. We do not want to know who you are. There is no need to do so; there is no desire to do so. The answers you check in the first six questions will help us to get group opinion summaries, but will in no way identify you.

2. NO SUPERVISOR OF NOPI WILL EVER SEE YOUR FILLED IN OPINIONS. Once you have put your answers in the provided ballot boxes, which are sealed, no one connected with NOPI will see them again. The boxes will be taken to Purdue University at 1600, Thursday 11 March, where the Opinions will be studied and analyzed. They will be destroyed when the study is finished.

3. THE OVER-ALL GROUP OPINIONS WILL BE MADE KNOWN TO YOU. When this study is completed, NOPI will be given a summary of results and recommendations. From it, they should receive information, assistance, and guidance. The study should be completed by June.

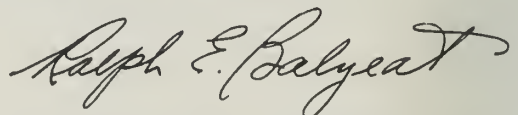
4. THIS IS NOT A RATING DEVICE, NOR IS IT A TEST. There are no "right" or "wrong" answers. Please try to answer every question, but if you feel you can't answer some, then answer the others and turn in your ballot anyway.

5. WE WOULD LIKE YOUR FRANK AND HONEST OPINION. This survey is going out to everyone in the Industrial, Research and Test, Quality, and Engineering Departments. You have a wide variety of jobs, experience, and skills. It is hard to design a questionnaire suitable for everyone, where so many different backgrounds are involved. Therefore, if you feel you can't answer the questions honestly and sincerely, just put your Opinion sheet in a ballot box without filling it in. Please don't talk over the questions with other employees -- just tell what you think. Several questions have space provided for write-in comments, should you desire to make any.

6. IN SUMMARY, THEN, PLEASE

1. Fill out the form honestly, to the best of your ability.
2. Fold it and put it in the attached envelope.
3. Put the envelope in any convenient "ballot box" by 3 P.M. on Thursday, 11 March. The sealed ballot boxes will be taken to Purdue University at 4 P.M. the same day.

Your cooperation in filling out and returning this Opinion sheet promptly will be very much appreciated.



RALPH E. BALYEAT
Supervisor of Industrial Relations Courses,
Industrial Engineering Department,
Purdue University.

NOPI EMPLOYEE OPINION

IN THE FIRST SIX QUESTIONS, INDICATE WITH CHECK MARKS WHICH GROUPS YOU ARE IN

- 1) Department
 ___1. Industrial
 ___2. Engineering
 ___3. Research & Test
 ___4. Quality
- 2) I have worked at NOPI
 ___1. Less than a year
 ___2. One to three years
 ___3. Four to six years
 ___4. Over six years
- 6) General Job Area (Please check the one group into which you most nearly fit)
 ___1. Engineer (Mechanical, electrical, civil, industrial, ordnance, etc.)
 ___2. Professional other than Engineer (Chemist, physicist, mathematician, technical inspector, technical planner or estimator, technical analyst, etc.)
 ___3. Sub-professional (General inspector, general draftsman, general analyst, general publication editor, etc.)
 ___4. Clerical (Storekeeper, stenographer, secretary, file clerk, typist, calculating machine operator, other clerks, etc.)
 ___5. Shop, skilled (All types journeymen, such as machinists, instrument makers, ordnance-men, electroplaters, etc.)
 ___6. Shop, semi-skilled (Machine operator, parts assembler, helpers, apprentices, ordnance-workers, etc.)
 ___7. Other (If you can't fit yourself into one of the above breakdowns, check here)
- 7) Regarding Ordnance Plant matters that are of interest and concern to me I feel
 ___1. I am kept very well informed
 ___2. I am informed on most matters
 ___3. I get very little information
- 8) As a usual thing, I get most of my information regarding Ordnance Plant policies and regulations and the reason for them by means of
 ___1. My supervisor, as soon as I need to know it
 ___2. My supervisor, but when it is too late
 ___3. My supervisor, but after I have heard it through the grapevine
 ___4. Ordnance Plant printed information, such as bulletin boards, station notices, memoranda, BOMBSIGHT, etc.
 ___5. Actually, I get very little such information.
- COMMENT _____
- 9) How good a job is being done in explaining to employees what the NOPI Policies and Regulations are and the reason for them?
 ___1. Not very good
 ___2. Only fairly good
 ___3. Quite good
- 10) Do you have group meetings in which employees in your working group can discuss things with your supervisor?
 ___1. Never
 ___2. Seldom
 ___3. Occasionally
 ___4. Often
- 11) How worthwhile do you consider these meetings are?
 ___1. Very worthwhile
 ___2. Fairly worthwhile
 ___3. Not very worthwhile
 ___4. A waste of time
 ___5. We don't have such meetings now
- 12) How much of BOMBSIGHT do you read regularly?
 ___1. Most of it
 ___2. About half of it
 ___3. Just a little of it
 ___4. I don't read it
- 3) Personnel Class
 ___1. Per DIEM
 ___2. Per ANNUM
- 4) I am a
 ___1. Supervisor
 ___2. Non-Supervisor
- 5) My yearly earnings at NOPI are about
 ___1. \$6000 or more
 ___2. \$4000 to \$6000
 ___3. \$2750 to \$4000

FIG. 9. NOPI EMPLOYEE OPINION

13) As regards my present job

- ☐1. I do not like it and I would prefer something else
- ☐2. All things considered, I like it pretty well
- ☐3. I like it very well

14) I find my work is

- ☐1. Very interesting
- ☐2. Fairly interesting
- ☐3. Not very interesting
- ☐4. Extremely dull

15) The amount of "paper work" I do on my job, considering the type of work I do, is

- ☐1. Very little
- ☐2. Necessary and reasonable
- ☐3. More than seems necessary
- ☐4. Too much

16) As to my personal work abilities, I feel my job

- ☐1. Fails to use them
- ☐2. Uses some of my main abilities
- ☐3. Uses most of my main abilities
- ☐4. Uses all of my experiences and abilities
- ☐5. Is too difficult

17) For the most part, my fellow workers in my group are

- ☐1. Very friendly and helpful
- ☐2. Fairly friendly and helpful
- ☐3. Indifferent to me

18) When you are first given an assignment, how much information and help does your supervisor give you?

- ☐1. I never get what I need
- ☐2. I seldom get what I need
- ☐3. I usually get what I need
- ☐4. I always get what I need

COMMENT _____

19) Are you satisfied with the credit you receive from your supervisor when you do a good job?

- ☐1. Entirely satisfied
- ☐2. Quite satisfied
- ☐3. Only fairly satisfied
- ☐4. Not at all satisfied

20) In regard to his technical know-how, I believe my immediate supervisor is

- ☐1. Highly capable
- ☐2. Quite capable
- ☐3. Good enough for his job
- ☐4. Lacking in some necessary respects
- ☐5. Not qualified for his job

21) In regard to his ability to handle and get the most out of his work group, I believe my immediate supervisor is

- ☐1. Not qualified for his job
- ☐2. Lacking in some necessary respects
- ☐3. Good enough for his job
- ☐4. Quite capable
- ☐5. Highly capable

22) Usually, when I discuss a grievance with my supervisor

- ☐1. It is settled in a fair manner by him
- ☐2. He passes it up the line where it is usually settled in a fair manner
- ☐3. He passes it up the line but it is seldom settled to my satisfaction
- ☐4. He tries to help me but he is helpless to correct the situation
- ☐5. He ignores the complaint or at least does nothing about it
- ☐6. He settles it his way, but not in a fair manner

COMMENT _____

23) Do you think your supervisor tries to be fair and impartial to each employee (for example, in assigning work, granting requests, getting each to do his share, etc.)?

- ☐1. Sometimes
- ☐2. Usually
- ☐3. Always

24) How often does your supervisor discuss your job performance with you?

- ☐1. Only when something goes wrong
- ☐2. Once a year
- ☐3. At least every six months
- ☐4. Seldom or never
- ☐5. Often enough, but not on a regular schedule

- 25) Do you feel free to approach and talk to your immediate supervisor about your promotion possibilities?
 ___1. I always feel free to talk this over
 ___2. I usually feel free to talk this over
 ___3. I usually hesitate to talk this over
 ___4. I never feel free to talk this over
- 26) NOPI as a place to work, compared to other activities or companies that I know about or have worked for, is
 ___1. Just average ___2. Better than average ___3. One of the very best
- 27) Do you feel that the management of NOPI, down to and including your immediate supervisor, delegates enough responsibility and authority to get the best results from its employees?
 ___1. Yes ___2. No ___3. Don't know
 COMMENT _____
- 28) When I run into a difficult problem on my job
 ___1. I know how far I'm supposed to go before asking my supervisor for help
 ___2. Occasionally I find I do not ask my supervisor for help soon enough
 ___3. It isn't clear to me whether I should ask for help or go ahead on my own
- 29) Are you given a chance to offer your ideas when decisions are to be made which fall within your job responsibility?
 ___1. Seldom or never ___2. Only occasionally
 ___3. Yes, usually ___4. Yes, always
- 30) How do you feel about the advancement you have made at NOPI to the present time?
 ___1. Very satisfied ___2. Fairly satisfied
 ___3. Neither satisfied nor dissatisfied ___4. Somewhat dissatisfied
 ___5. Very dissatisfied
 COMMENT _____
- 31) How do you feel about your chances for further advancement at NOPI?
 ___1. I feel my chances are poor ___2. There is some chance
 ___3. I feel my chances are good ___4. I like the job I have and do not care to advance further
 COMMENT _____
- 32) The place where I do my work
 ___1. Is well arranged and laid out for the work I do
 ___2. Could be improved on somewhat
 ___3. Is poorly arranged or crowded for what I have to do
- 33) Is your work interrupted by lack of material, tools, supplies, or instructions?
 ___1. Often ___2. Seldom ___3. Never
 COMMENT _____
- 34) The way I feel about methods improvement and work simplification is
 ___1. I haven't thought much about them
 ___2. Whenever I find a better way to do my job, I tell my supervisor about it
 ___3. I use the Beneficial Suggestion Program when I find a better way to do my job
 ___4. I often find simpler and better methods for doing my job and use them, but don't bother to tell anybody about them
 COMMENT _____
- 35) Considering the kinds of products we make at NOPI, I feel our production control and present manufacturing methods
 ___1. Cannot be materially improved ___2. Could be improved in some instances
 ___3. Need improvement in many situations ___4. I do not know
 COMMENT _____

FIG. 9. NOPI EMPLOYEE OPINION

36) For my type of work, the equipment I use at NOPI is

- ☐1. In need of replacement ☐2. Not as good as most places
☐3. Better than in most places ☐4. The best obtainable

37) How do you feel about motion and time study?

- ☐1. I don't know enough about it to say
☐2. Due to the many different products we make, it wouldn't be at all applicable in any of our production operations.
☐3. Even though we make many different products, it could be used to advantage in at least some of our production operations
☐4. I feel we could apply it to many of our production operations to good advantage

COMMENT _____

38) The forms I use in my job are

- ☐1. Well designed for filling in necessary information
☐2. Poorly laid out for filling in necessary information
☐3. Poorly laid out and require unnecessary information
☐4. I do not use forms in my job

39) I feel that the time lost in handling raw materials and semi-finished products at NOPI is

- ☐1. Excessive ☐2. Normal
☐3. Very low ☐4. Don't know

40) To help me do my best work, apart from experience on my job,

- ☐1. I get a great deal of the right kind of training
☐2. I get some training of the right kind
☐3. I do not get enough training
☐4. I get no training, to speak of
☐5. I get too much unnecessary training

COMMENT _____

41) When I have a personal problem, the person I usually go to for help is

- ☐1. My supervisor ☐2. A fellow worker
☐3. Nobody; I try to work it out for myself ☐4. A member of the Employee Relations Division
☐5. Someone outside the Plant

42) Do you feel that the present Civil Service system for Performance Rating does rate you fairly in your present job performance?

- ☐1. Yes ☐2. Don't know ☐3. No

COMMENT _____

43) How much of your working time do you feel is devoted to handling "red tape", that is, paper work which seems to needlessly complicate your job performance?

- ☐1. 0% to 5% ☐2. 6% to 15%
☐3. 16% to 25% ☐4. More than 25%

44) Concerning the Navy Employees Beneficial Suggestions Program

- ☐1. I have submitted one or more suggestions and have had one or more accepted.
☐2. I have submitted suggestions, but have Not had any accepted
☐3. I know about the program and like it, but have not submitted any suggestions
☐4. I know about the program and do not like it; I haven't submitted any suggestions
☐5. I do not know the details of the Program

COMMENT _____

45) I would rather pass my suggestions up the line through my supervisor than use the Beneficial Suggestion Program.

- ☐1. Agree ☐2. Disagree ☐3. No opinion

- 46) "Red tape" and delay are held to a minimum in the Beneficial Suggestion Program.
 ___1. Agree ___2. Disagree ___3. No opinion
- 47) The money and recognition given for accepted suggestions are strong incentives for getting ideas that might not otherwise be thought about
 ___1. Disagree ___2. Agree ___3. No opinion
- On these last two groups of questions, please mark a "1" before your first choice, a "2" before your second choice, and a "3" before your third choice. (NOT just check marks)
- 48) What three things do you look for most in a higher level job? (Number in order of importance to you 1-2-3.)
- 49) importance to you 1-2-3.)
- 50)
- ___1. Having more security ___2. Having more authority
 ___3. Being closer to the higher-ups ___4. Having more independence
 ___5. Having more feeling that people appreciate my work
 ___6. Having a chance to do more responsible work
 ___7. Receiving more pay
 ___8. More opportunity to apply my training and know-how
- 51) What three items from the list below seem to count most in determining whether or not a person at your level will get a recommendation for promotion to fill a job vacancy in your department? (List in order of preference 1-2-3)
- ___1. The amount of work a person turns out
 ___2. The length of time in the Ordnance Plant
 ___3. The amount of initiative a person shows
 ___4. The experience a person has in the job
 ___5. How a person stands with the person he works for
 ___6. The quality of work a person turns out
 ___7. The length of time since last promotion
 ___8. The ability and training a person has to have to do the job
 ___9. The ideas and originality a person shows
 ___10. Who the person knows in the Ordnance Plant

When you have finished, be sure to put your questionnaire in the envelope and put it in a "ballot box" by 3:00 P.M. THURSDAY 11 MARCH. Again, we wish to thank you for your cooperation and help.

FIG. 9. NOPI EMPLOYEE OPINION

at random order in the possible replies, rather than at one general location. This was to ensure the employee's reading through all possible choices, rather than to put him in the habit of checking the first or last phrase under all questions as a matter of routine (the so-called "carry-over" effect).

3. Identification data of six types. Included were Department where employed; personnel class (whether graded or ungraded); length of employment at NCPI; whether supervisor or non-supervisor; broad salary range (yearly earnings); and general job area. As previously stated, this was more identification than required for this study. Still, it was considered that for further internal research by the management of NCPI, it would be asked for and would therefore be available if desired.

4. A covering Memorandum from the Commanding Officer to the employees to be polled, plus a letter of instructions and solicitation of cooperation. These were included to emphasize that the individual's opinion was considered important by NCPI, to give the administrative details on how to mark and return the questionnaire, and to emphasize the anonymous nature of the responses.

5. Write-in space for comments, both at certain places in the body of the questionnaire and at the end.

Method of Distributing and Collecting the CFINICNs. In order to see how good a response could be solicited from this method alone, the distribution of the CFINICN forms was handled directly by the chain of command through line supervision. No bulletin board information was used, no preliminary information was incorporated in the employees' bi-monthly periodical, BCMBSIGHT, and no broadcast concerning the questionnaire was announced over the plant-wide public address system. Department Heads received the forms for their Departments, and passed them to subordinate supervisors. The Department Heads were requested to enlist cooperation of their subordinates in replying to the poll, but, except for trying to ensure that each eligible employee received a blank form, no other publicity medium other than that contained in the questionnaire itself was used.

The forms were distributed to the Department Heads by noon Tuesday 9 March 1954. Sixteen locked or sealed ballot boxes were provided for ballot returns at locations in the more densely populated work areas of the Departments affected. The employees were allowed to fill in the forms on the job at times designated by their respective supervisors, or they could take them home to fill them out if they so desired. The period selected for the survey was purposely made between pay-day periods to minimize this influence on employee opinions.

At 4:00 P.M. on Thursday, 11 March 1954, the ballot

boxes were collected, their contents in the sealed envelopes consolidated so they could be carried back to Purdue University by automobile, and the ballot was completed. No provisions for late returns was made, although some might have been turned in.

Using the expressed method, 2311 blank OPINIONS were handed out. A total of 1667 returns resulted, 1054 of which were filled in completely enough to be tabulatable. The 1054 represented a 71.5% response.

EVALUATING THE QUESTIONNAIRE RESULTS

Sorting and Arranging the Returns

After all questionnaires were removed from the envelopes, they were sorted first into two general categories; those containing write-ins and those without write-ins. In the former category were 756 ballots; in the latter, 898. These latter were delivered to the statistical laboratory at Purdue University for key punching and verifying the responses on IBM machine cards. The 756 CPINIONS were then further sorted by hand into groups containing significant comments and those considered by the writer to be not significant. This grouping resulted in 456 CPINIONS with significant comments and 300 ready for immediate key punching. (These 300 had contained write-ins considered already answered by indicated check marks or write-ins which were incoherent, for the most part. A considerable number contained the comment under question 22 "I have had no grievance" or words to that effect. This pointed up the most outstanding weakness of the entire questionnaire, as far as giving the employees a wide enough choice of answers, even though this wasn't disclosed in the sample poll.)

Proceeding with the sorting, of the 456 ballots with write-ins, 398 had comments at the end of the questionnaire; it was decided to classify these write-ins for inclusion in tabulating. The internal write-ins were not, although tally-

sheets were prepared and frequency of comments by type written down. Lack of clerical aid and the desire to keep expenses to a reasonable figure dictated this course. Thus, classified and tabulated comments were included on 24.0% of the 1654 total tabulated returns. Some of the end-space write-ins concerned only one classification area; others touched upon as many as six.

A Classification Plan was drawn up to cover the areas included in the 398 end-of-ballot comments. Table 1 shows the plan used. Three breakdowns within each category were used to show: a. a favorable comment; b. an unfavorable comment; and c. a suggestion in the area concerned. Two independent raters then went through the write-ins and wrote down the numbers which represented the type of comment. The two lists were compared and the items showing identical classification were coded on the questionnaire form for IBM card tabulation. Many comments bore only indirectly on the areas of the OPINION survey, but were classified nonetheless. As will be seen from the results of tabulation, the range of the comments was very broad.

Tabulating the Results

After all questionnaires had been key punched and verified on IBM cards, these cards were taken to the Ordnance Plant for tabulating. With limited time available, the decision was to tabulate by Department, and by per annum and

TABLE 1.

THE CLASSIFICATION PLAN

FOR COMMENTS

1. NOPI and NOPI TOP MANAGEMENT
 1. Ordnance Plant reputation
 2. Organization policies
 3. Management attitudes
 4. Management procedures
 5. Employee attitude toward NOPI
 6. Employee attitude toward management
2. SUPERVISION
 1. Supervisor to supervisor relations
 2. Supervisor to subordinate relations
 3. General
3. JOB SATISFACTION
 1. General
 2. Advancement opportunity
 3. Advancement to date
 4. Recognition of the individual
 5. Job position descriptions
 6. Fellow employees
 7. Job interest
4. PAY
 1. General
 2. Internal relationships
 3. External relationships
 4. Step increases
5. WORKING CONDITIONS
 1. General
 2. Plant and equipment
6. PLANT PRODUCTION EFFICIENCY
 1. General
 2. Methods and production
 3. People as a production factor
 4. Utilization of people
7. PERSONNEL POLICIES
 1. Promotion policies and procedures
 2. Favoritism, bias, prejudice, etc.
 3. Training

TABLE 1. (continued)

8. COMMUNICATIONS

1. General
2. Meetings and conferences
3. BCMBSIGHT

9. EMPLOYEES BENEFICIAL SUGGESTION PROGRAM

1. General
2. Effectiveness

10. PERFORMANCE RATING

1. General

11. MISCELLANEOUS

1. General
2. Training needs
3. Leave
4. Over-all planning
5. Availability of materials.

per diem only. This necessitated fifteen sortings--one for each Department plus one for those OPINIONS which did not specify which Department the responder was in, or five, and one each for per annum and per diem, plus one for those not indicating which personnel class they were in, or three. This amounted to five divisions, each further subdivided into three divisions, for a total of fifteen. Obtaining these tabulated totals and converting them to percentages took about two and a half weeks and was done by NCPI personnel.

General Considerations

Prior to presenting and discussing the results obtained from the OPINION poll, it would be well to mention some cautions applicable to questionnaire results in general. Although a detailed discussion is outside the scope of this paper, some general considerations are well worth comment. Among these are:

1. The fact that the results are based on what people think or feel. Thus, the results summarize group opinion; they are necessary to help us find out the thinking of people regarding areas set forth in the basic questionnaire. They may or may not reflect accurate information. For example, the mere belief that his supervisor wasn't as cordial in his greeting in the morning as he might have been may sour that employee's opinion of supervision temporarily, and be re-

flected in the way the employee answers his questions concerning supervision. Or, he may be angry with his mother-in-law, and take his feelings out on how he answers concerning management. This probably doesn't affect all employees the same way at the same time, however, so it is considered that over-all results tend to reflect employees' thoughts on any typical working day. On the other hand, if the survey happened to be conducted on a hot summer day when the air conditioning broke down, general group feelings toward their workplaces would tend to be largely less favorable than it generally is. In the present study, for example, an Engineering Department reorganization proposal was set forth just as the questionnaire was presented at NCPI. Several CPINICs from personnel in Engineering remarked feelingly on this matter, and possibly the average job satisfaction opinion was lowered because of this. On the other hand, if the entire purpose of the change had had a chance to be discussed and analyzed by the individuals, and their opinions thereby modified, the results might have been considerably raised.¹⁶

¹⁶ The Engineering reorganization at NOPI is a long term gradual one. It will take about a year to complete. Disruption of personnel groups and projects worked on will be held to a minimum. A maximum of consultation within the Department is being used. The change was initiated in order to improve the departmental efficiency and productivity. However, vague, anxiety-causing rumors often precede the facts of a change, and it was thus in this case. Now that the purpose of the reorganization is widely understood, the employees want to institute the changes immediately and seem enthusiastic about it!

2. The results are qualitative, even though measured on a quantitative basis. Even so, despite individual differences inherent in working with human beings, trends in group thinking can be significant to management. However, it is well to keep in mind that "Efforts to 'standardize' employees have proved futile simply because people do not all fit into the same pigeonhole, and efforts to make them so conform will almost invariably produce repercussions. People have different motives and different goals, and their behavior is determined by those motives and goals." ¹⁷

3. Subjective judgment must enter into assessing what is meant by percentages of responses. In some cases a reply of 80% favorable answers may indicate intensive correction is necessary in order to approach a desired 95% favorable level. On the other hand, 5% very dissatisfied replies can be an important indicator.

¹⁷C.H. Lawshe, Jr., Psychology of Industrial Relations (New York: McGraw-Hill Book Company, 1953), p. 35.

RESULTS AND DISCUSSION

Method of Presenting Results

In the ensuing presentation of the results of the Opinion questionnaire, the following general plan will be observed:

(1). The over-all breakdown of participation will be given, by category of workers by Departments as to Per Diem or Per annum employees.

(2). Each question, commencing with number six, will be listed. It will be followed by its possible choices of answers. Next to each possible choice will be placed the percentages of replies listing that choice. In all cases, those percentages listed immediately to the left of the answer will be the response of Per Diem employees. Those percentages listed immediately to the right of each response will represent the answers given by Per Annum employees. The Commanding Officer's choice of the answer he felt would be checked by a majority of the entire survey population will be indicated by an asterisk at the far left of the answer he selected. The actual highest percentage checked by the entire survey population, including 110 unidentified questionnaires, as well as those identified as to Per Annum and Per Diem employees, will be enclosed in parentheses at the far right of the choice where it occurred. In this way, the awareness of the Commanding Officer as to the pulse of

of the NCPI employees' feelings and experiences can be compared. This was included, not to put the Commanding Officer "on the spot", but to see how good top management's empathy was.

(3). Following the percentage presentation and question listing, a brief discussion of that question's results will be given. In cases where a finer breakdown is desirable into differences of results among Departments, to determine areas of difference as well as items of difference, the discussion will include these. Also included will be summaries of comments written in below applicable questions, where these comments appear to be significant.

(4). Where applicable, certain NCPI records will be introduced into the discussion of results, to give factual bases from which to judge the opinions expressed.

(5). When all questions have been discussed, a resumé of the comments written in at the end of the Opinion questionnaire will be shown.

(6). Throughout the results presentation, no attempt will be made to correlate the answers to any one question with those of any other, although examination may well show several questions to be highly intercorrelated with others in the same general questioning area. Each question will therefore be presented as an entity in itself.

Analysis of Participation

Table 2. lists the manner in which responses to the

NCPI Opinion questionnaire were categorized. The numbers in single parentheses following the number of responses received indicate the numbers of employees polled. The numbers in double parentheses indicate the percentages of response.

Thus, in presenting the results, the percentages shown next to the choices of answers to questions will be based on 1,013 employees as 100% for the Per Diem employees, and on 531 as 100% for the Per Annum employees. In this manner, the differences in responses by the two groups can easily be noted. Since 110 returned forms did not identify the responder as being in one group or the other, their results will not be listed separately. Their weight was considered in arriving at complete percentage breakdowns for the entire number of employees participating, of which only the greatest response percentage will be listed, in parentheses at the extreme right of the answer where occurring.

Appendix A. lists the percentage responses to all questions.

Results by Question Numbers

Question Number 6. General Job Area. (This identification question is included here to show the reader the approximate numbers of various types of employees responding to the questionnaire.)

(Per Diem)	2%	C. No answer	0.9%	(Per Annum)
	5%	1. Engineer	33%	
	5%	2. Professional other than Engineer		

PARTICIPATION BREAKDOWN

Participation, (Population), and ((Percentage of Participation to Population)),
by Employee Category

DEPARTMENT	PER DIEM	PER ANNUM	NOT IDENTIFIED
INDUSTRIAL	848 (1492) ((56.8%))	119 (140) ((85.0%))	64
ENGINEERING	40 (55) ((72.7%))	252 (310) ((81.4%))	9
RESEARCH & TEST	18 (29) ((62.0%))	69 (93) ((70.4%))	1
QUALITY	31 (93) ((87.1%))	82 (94) ((87.2%))	4
Not Identified	26 ----	9 --- ----	32
TOTAL	1013 (1669) ((60.7%))	531 (642) ((82.8%))	110

GRAND TOTAL: 1054 employees responded; 2311 questionnaires were distributed;
Percentage of returns: 71.5%

TABLE 2.

4%	3. Sub-professional	13%
C.7%	4. Clerical	22%
51%	5. Shop, skilled	4%
29%	6. Shop, semi-skilled	3%
2%	7. Other	2%

Question Number 7. Regarding Ordnance Plant matters that are of interest and concern to me I feel

2%	0. No answer	1%	
31%	1. I am kept very well informed	26%	
54%	2. I am informed on most matters	58%	(55%)
13%	3. I get very little information	15%	

This response indicates that little difference exists between the way the two groups feel concerning this question. It does indicate the need for getting information to more people, however, as more than one person out of ten feels slighted on the information he receives. Parenthetically, 23% of the Per Annum personnel in the Engineering Department stated they got very little information; that this is so much at variance with the mean for all Per Annum workers is doubtless due to the Engineering Department reorganization plan, discussed earlier. The results for this answer, among Per Annum employees in the other three Departments were Industrial, 10%; Research and Test, 7%; and Quality, 6%.

In the Per Diem employees' response to this same answer, 13% in Industrial, 12% in Engineering, zero percent in Research and Test, and 16% in Quality checked this choice, that they got very little information.

Since the same media of communications are available to all Departments, it is suggested that NOPI management give some thought to the location and spacing of bulletin boards

among Departments so that all employees may have more access to them. Also of interest is the fact that two of the Departments reporting the highest percentages of never having group meetings (see question 10.) are the highest in feeling uninformed on Ordnance Plant matters. On the other hand, Research and Test had a high percentage, relatively, among its Per Diem workers who stated they never had group meetings, and yet none of them stated that they were uninformed. This might infer that due to the smallness of the Per Diem group in the Research and Test Department, group meetings are unnecessary and close supervisory contact is maintained with each individual as a regular routine. On the other hand, the quality of supervision as regards getting and passing on information may be a factor.

No specific suggestion can be made, for what may be considered ample information by one employee may be considered insufficient by another. However, in general it is indicated that the communication media available are either insufficient or they are not being utilized with full effectiveness in getting information from the top of the organization down through all levels. In the writer's estimation, the channels of communication are established in enough numbers and variety, but they are being used at less than optimum effectiveness.

Question Number 3. As a usual thing, I get most of my information regarding Ordnance Plant policies and regulations and the reason for them by means of

	1%	0.	No answer	2%	
*	44%	1.	My supervisor, as soon as I need to know it	41%	(43%)
	0.9%	2.	My supervisor, but when it is too late	2%	
	24%	3.	My supervisor, but after I have heard it through the grapevine	22%	
	33%	4.	Ordinance Plant printed information, such as bulletin boards, station notices, memoranda, BOMBSIGHT, etc.	37%	
	2%	5.	Actually, I get very little such information	4%	

This response would indicate that the two primary means of communication at the Ordnance Plant were functioning properly. The small percentage of people not getting information is probably a tribute to the efficiency of communications at NOPI; still, it indicates some room for improvement. Also suggested is the idea that much rumor and/or information passes rapidly through NOPI by the "grapevine", a not unusual situation, but one sometimes fraught with frustration for the supervisors in that they, who should be the first to know policies and regulations and to pass them on to the employees under them, often are among the last to know.

A breakdown by Departments for choices of response one, three, four, and five follows:

	Percentages Responding to Choice							
	1		3		4		5	
	Diem	Annum	Diem	Annum	Diem	Annum	Diem	Annum
Industrial	43%	47%	25%	17%	33%	39%	2%	5%
Engineering	55%	29%	15%	28%	22%	39%	10%	6%
Research & Test	50%	46%	17%	12%	44%	51%	0%	1%
Quality	48%	62%	26%	20%	27%	20%	2%	1%

From this breakdown, it can be seen that fewer Per Diem people in Industrial get their information on Ordnance Plant policies and regulations from supervisors soon enough than in any other Department. Considering the size of the group involved, this is probably as expected. In the Per Annum group in this same category, the Engineering personnel are quite far below the other groups; again, this may be due to the Engineering Department reorganization halo effect.

Also as might be expected, the Research and Test people in both personnel categories get more information by means of printed media than any other group. The people seeming to get the least information appear to be located in Engineering, but again this may be due to the halo effect. Throughout the entire questionnaire, it is impossible to estimate the effect of the Engineering reorganization on the results, but it appears to be considerable. On the other hand, it is not suggested that all rather unfavorable responses in that Department should be considered without meaning due to the reorganization; a careful appraisal within the Department may show conditions which are in actual need of correction, and upon which the impact of the planned organizational change made no real difference.

Among the submitted comments considered to be of some interest or importance to NOPI management were included the following:

1. Late information not the fault of the supervisor.
2. Usually I get "chewed out" before I have heard the

rule stated.

3. My supervisor is reluctant to pass information on; however management in general is good about this.
4. Public address system should announce special collections--like Blue Cross, etc.
5. Need a Public Address system that all can hear. Also, the PA system does not work well.
6. Insufficient communications, plus inadequate information.
7. Reasons not given except upon questioning about them.
8. We get more rules than reason.
9. NOPI policy of disposing of surplus material not put out well.
10. Do not feel free to read bulletin boards due loss of time. No set time to do this.
11. Discussion of rumors accounts for a lot of wasted time.
12. Reorganization of Engineering Department information gained through grapevine.

From two to six separate questionnaires listed each of the above comments or a paraphrase thereof. Since the most frequently written-in comment reflected less than 0.4% of the questionnaire population on this question, the significance of the statements made evidently apply only to isolated individuals. However, it appears that emphasis could be placed on explaining the reasons for policies and regulations to promote better Plant-wide understanding of them. That this need is evident is shown by the results of question 9. This might well be done by a statement placed on written communications, expanding the minimal information generally contained under "Purpose" of the notice or instruction. Also, supervisors could be instructed to give reasons, where possible, in passing information verbally concerning changes in rules and institution of new ones.

Question Number 9. How good a job is being done in ex-

plaining to employees what the NOPI Policies and Regulations are and the reason for them?

Per Diem	1%	0.	No answer	3%	Per Annum
	12%	1.	Not very good	16%	
	39%	2.	Only fairly good	43%	
*	47%	3.	Quite good	38%	(45%)

On this question, Per Diem workers, in general, felt that a better job was being done than did the Per Annum workers. An inter-Departmental comparison shows the following results:

Percentage Response to Choice

	1		2		3	
	Diem	Annum	Diem	Annum	Diem	Annum
Industrial	12%	10%	39%	41%	47%	45%
Engineering	8%	23%	48%	45%	45%	29%
Research and Test	11%	14%	50%	42%	39%	39%
Quality	20%	7%	35%	37%	44%	54%

Quality Per Diem workers have the highest response of Per Diem employees who believe a "not very good" job is being done, while the same Department's Per Annum personnel have the smallest response. Engineering Per Annum people again seem considerably out of line with other Departments' responses, being high in believing "not very good", and low in feeling "quite good". All groups indicate that much improvement is necessary. In this regard, the Naval Ordnance Laboratory attitude survey showed similar findings. In fact, the report of the Evaluating Committee had this to say: "... in no area is there a strong reflection that the people feel satisfied that they are adequately informed as to policy and

regulations, and the reasons for them."¹⁸ In line with this same idea, Yoder has this to say:

A primary purpose in maintaining effective communication is the accurate and dependable transmission of orders and instructions. All divisions of the organization must know what they are expected to do. They cannot do their part without information on what that part involves. Moreover, supervisors and employees may be expected to carry out orders more rapidly, accurately, and enthusiastically if they know the reasons behind those orders. Why is the job to be done in a certain manner? What do the orders mean? Who dreamed them up? Why are they different from those which have come through in the past? To be sure that supervisors know the answers requires effective communication.¹⁹

As a case in point, several questionnaires commented on the item of disposal of surplus or salvage material. Much resentment seemed to be based on the fact that valuable electronic items were smashed and destroyed rather than give the employees at NOPI a chance to purchase them and take them to their home workshops and make gadgets and/or experiment with the parts. Now, it is obvious that disposal of certain items of firecontrol equipment which failed to pass the rigid inspection requirements laid down might be dictated by Bureau of Ordnance policy, or even Department of Defense policy, concerning compromise of security information. Small assemblies or even sub-assemblies would doubtless fit into this category. Also, many items that are unique to aviation

¹⁸Quoted from the Chairman's report to the Commander, Naval Ordnance Laboratory, in a memorandum dated 19 February 1953.

¹⁹Yoder, op. cit., p. 382.

firecontrol equipment might be classified as security information. On the other hand, perhaps there are some individual component parts that are similar to any that can be purchased at a radio spare parts shop, and whose authorized sale to employees would not compromise the national security but would allow them the opportunity to obtain parts more cheaply. At all events, it is suggested that on items like this, where employees raise questions as to a policy expressed or carried out by NOPI, that enough information be circulated as to the reason for the policy that the employee knows and appreciates the fact that a certain procedure can't be done because of security requirements, or, if modifications within the policy can be examined as to feasibility, that this be carried out and changes made as a result.

Question Number 10. Do you have group meetings in which employees in your working group can discuss things with your supervisor?

	2%	0. No answer	2%	
	27%	1. Never	17%	
	25%	2. Seldom	26%	
	38%	3. Occasionally	42%	(39%)
*	8%	4. Often	12%	

The people comprising a work group at any level of an organization are individuals, and each individual has the ability to think, to get and express ideas, to experience frustrations, to wonder about the implications of rumors, and to work more or less effectively as these and other basic behaviour-modifying factors are expressed or bottled up within him, as the case may be. If his ideas aren't solicited,

if he holds back information that could be shared with profit throughout the group, he isn't as effective a member of the organization as he well could be. He may believe that he has good ideas and he may want to share them with his supervisor or fellow workers. However, if there is no opportunity to do this, he may become disinterested and adopt a "who cares" attitude. His need for participation and recognition can be materially helped by taking part in group meetings within his area of work and responsibility.

It appears from the answers to the above question that there needs to be an improvement in both the number and frequency of group meetings at NOPI. As Thomas G. Spates, retired Personnel Vice President of General Foods Corporation, and presently Professor of Personnel Administration at Yale University, put it in his "The American Code of Personnel Administration":

Sixth [point in the Code] is the practice of satisfying the desire for participation by means of consultation and explanation, both up and down, through all echelons of organization. If one were forced, under pain of severe punishment, to express the essence of sound personnel administration in just two words, those words would be "Consultation" and "Explanation". The acts implied by those two words influence greatly the attitudes of people and their response to the decisions that have to be made in the conduct of business. Even though decisions are, of necessity, sometimes unpopular, the negative consequences can be lessened by answers to the question "Why?".²⁰

A finer breakdown of the answers to this question shows:

²⁰From an address given at the 23rd Management Convocation, Rochester Institute of Technology, Rochester, New York, on April 12, 1949.

1. For Per Diem employees:

- a. 28% in the Industrial Department never have such meetings; 26% seldom have them, and 35% occasionally have them.
- b. 10% in the Engineering Department never have such meetings; 22% seldom have them, and 40% occasionally have them.
- c. 28% in the Research and Test Department never have such meetings; 17% seldom have them, and 39% occasionally have them.
- d. 25% in the Quality Department never have such meetings; 22% seldom have them, and 46% occasionally have them.

2. For Per Annum employees: (The percentages indicate never, seldom, and occasionally, in that order, as above).

- a. Industrial: 22%, 25%, and 39%.
- b. Engineering: 17%, 31%, and 37%.
- c. Research and Test: 16%, 26%, and 45%.
- d. Quality: 12%, 13%, and 61%.

It can be seen at a glance that this valuable method for presenting and sharing information and exchanging ideas within working groups is not being utilized at NOPI nearly as often as it could be. These meetings provide the opportunity for valuable "communication upward" by the employees, and they further strengthen the worker's inherent basic need for participation. Further, they permit the supervisor to pass managements' directives and policies down the line, and to answer questions as they appear. In order to get maximum value from such meetings, some sort of training supervisors in the art and method of conducting successful group meet-

ings should be undertaken. Also important in getting full effectiveness from such meetings is the timeliness of information in getting to the supervisors who conduct them.

The Personnel Handbook has this to say:

If the supervisor is to lead the unit, he must receive information in advance of the group. And he must know enough to supplement the information which is supplied by various media. The questions which his subordinates ask him will encourage him to ask questions of his superintendent, if lines of communication are open. In the opposite direction, the superintendent should seek the active participation of the supervisor in planning and scheduling communications.

Finally, it must be remembered that the workers within the unit are an extension of the supervisor himself in his function of conveying information. Workers learn from other workers as well as from the supervisor.²¹

Question Number 11. How worthwhile do you consider these meetings are?

	8%	0.	No answer	5%	
	40%	1.	Very worthwhile	37%	(39%)
*	24%	2.	Fairly worthwhile	32%	
	5%	3.	Not very worthwhile	7%	
	4%	4.	A waste of time	2%	
	19%	5.	We don't have such meetings now	16%	

With no attempt to correlate between this question and the previous one, it is obvious that a majority of NOPI employees consider such meetings worthwhile. In this regard, perhaps NOPI management would do well to investigate the value and optimum frequency of group meetings to discover factually if well-conducted group meetings do contribute to the

²¹John F. Mee, Editor, Personnel Handbook, (New York: The Ronald Press Company, 1951), p. 767.

productive efficiency of the organization.

At all events, despite the fact that few meetings are regularly held in most work groups at NOPI, this expression by the employees that they believe them to be worthwhile on the whole should be given a chance for verification. To emphasize employee opinion on this question, only the following total percentages were tabulated, for both the choice "not very worthwhile" and "a waste of time": Industrial, 9% Per Diem and 5% Per Annum; Engineering, 7% Per Diem, 15% Per Annum; Research and Test, 0% Per Diem, 7% Per Annum; and Quality, 11% Per Diem, 3% Per Annum.

Question Number 12. How much of BOMBSIGHT do you read regularly?

	0.9%	0. No answer	0%	
*	64%	1. Most of it	57%	(61%)
	19%	2. About half of it	25%	
	13%	3. Just a little of it	15%	
	3%	4. I don't read it	4%	

It appears that BOMBSIGHT is well received by NOPI employees. Just as with a commercial newspaper, readers find that certain sections appeal to them more than do others. Since nearly every employee picks up a copy of BOMBSIGHT to take home when it appears, the question was phrased as it was to determine how much of the paper was actually read.

Several comments were written-in about BOMBSIGHT. One stated that the respondent was unable to get a copy. The writer, however, was at the Ordnance Plant on the day an edition was distributed and observed that considerable copies

were available, placed on stands near the exits, even after working hours were over and the vast majority of employees had left the Plant. It may have been that this particular individual just didn't bother to pick up his copy; at all events, ample distribution points and sufficient copies were evident at the time observed.

Another comment stated that "too many of the same people appear in BOMBSIGHT, which makes it monotonous". Since this was an isolated commentary, as was the other one, no general criticism of the paper seemed apparent; still, due to the large numbers of employees reading only half of it or less, it is suggested that possibly one edition of the periodical include an insert questionnaire sheet. The questionnaire could include such items as what is liked best about BOMBSIGHT, what is liked least, what features are considered most interesting and least interesting, what suggestions can be made for improving the interest and readability of the paper, and possibly the Division to which the anonymous reader belongs. When returned to the editor, this questionnaire could aid in finding the strong and weak points in the employees' paper as now made up, and improvements in amount read should result from the incorporation of these suggestions.

BOMBSIGHT, using criteria enumerated in the Industrial Relations Handbook,²² seems to fulfill various requirements

²²Op. cit., Section 31.

well. It is attractively multilithed; it contains many clear, pertinent illustrations and photographs; it contains much personal news about a wide variety of employees; the material is written interestingly; the various feature and news items are written so that they appeal to the employees' families, making it a good home paper. Therefore, to determine what would make it appeal more especially to the NCPI employee group, the writer can only suggest that the employees themselves be given an opportunity to indicate their desires.

BOMBSIGHT is read more thoroughly by more Engineering Per Diem personnel (75%) than any other group. It is not read by more Research and Test Per Annum people (10%) than any other group. Fewer employees in the Research and Test and Engineering Per Annum groups read most of it, 45% and 51%, respectively, than any other groups. No Per Diem personnel in either Research and Test or Quality said they did not read at least part of it.

Question Number 13. As regards my present job

0.7%	0.	No answer	0.4%
5%	1.	I do not like it and would prefer something else	6%
45%	2.	All things considered, I like it pretty well	49%
* 49%	3.	I like it very well	44% (48%)

This question was based on one taken from the "Inside Western Electric" employee opinion survey,²³ and therefore

²³ See footnote 7.

forms some basis of reference to the NOPI employees' responses. In the Western Electric survey results, the breakdown was as follows to the question "How do you feel about your present job?":

- | | |
|---|-----|
| 1. I like it very well | 22% |
| 2. All things considered, I like it pretty well | 43% |
| 3. Job is all right | 17% |
| 4. I'd prefer something else | 15% |
| 5. I don't like it | 3% |

These results, it will be remembered, reflect the national average of responses by 5100 non-supervisory technical professional employees of Western Electric, a group reasonably similar to the large majority of NOPI employees in the Per Annum category. It appears upon comparison of the two results above that NOPI employees find far more interest in their present jobs than do the Western Electric employees. Although the breakdown used in the NOPI questionnaire wasn't quite as fine as that used in the Western Electric one, it can be seen that twice as many employees, percentagewise, at NOPI liked their jobs very well than did the employees of Western Electric. Also, lumping together the Western Electric results for both "I don't like it" and "I'd prefer something else", it is seen that 18% fall into these categories, versus the 6% of Per Annum employees at NOPI who checked that combined statement.

Even with the relatively 'good showing indicated by NOPI above, it should not be rationalized that there is no room for further improvement. Since 46%, over-all, of the Ord-

nance Plant employees indicated that they liked their job only pretty well, a large minority feels that something is lacking in their jobs. What this something is cannot be determined on the basis of this general question. For one man, it might mean that he doesn't get to exercise enough responsibility or authority in his present position; for another, it might mean that he has to do more routine paper work that he'd like to have to do.

One general area of interest concerning this question is the relatively high regard of present job by the Per Diem workers. In all parts of the question, their responses were more favorable, slightly, than were the answers of the Per Annum group. This response is at variance with results found by certain other investigators in private industry. Lawshe states:

Evidence obtained by Super... and Fairchild ... indicates that there exists a positive relation between satisfaction and occupational or skill level; that is, the higher the occupational level, the greater the satisfaction derived is likely to be ... This trend suggests that our industrial organization has been able to provide those in the upper occupational levels with satisfying work, but that it has been less successful in providing the factory employee, the clerk, and those in the less skilled areas with similar satisfaction.²⁴

That this is not true for NCPI can be better visualized by a finer breakdown of results by Departments. (Per Diem responses to left; Per Annum to right.)

²⁴Lawshe, op. cit., p. 71.

Department	Percentage response by choice number					
	1.		2.		3.	
Industrial	5%	6%	45%	50%	49%	43%
Engineering	2%	7%	40%	52%	58%	41%
Research and Test	0%	6%	56%	49%	44%	45%
Quality	5%	4%	51%	40%	44%	56%

The Quality and Research and Test Departments' Per Diem employees exhibit less satisfaction than do those in Industrial and Engineering, but their numerical strength is not enough to counterbalance the over-all Per Diem results over that of the Per Annum people.

To summarize, NOPI employees seem much better satisfied with their jobs than do Western Electric technical, professional, non-supervisory employees; over-all, Per Diem workers are better satisfied than the Per Annum people; and room for improvement of job satisfaction is evident for both groups. Selection and placement are good, in general, but perhaps these tools of management can be better utilized in the future in order to give even greater job satisfaction to a larger number of NOPI employees.

In the ensuing questions, more job satisfaction areas are surveyed, and more specific recommendations may be formulated on the basis of noted results.

Question Number 14. I find my work is

	0.6%	0.	No answer	0.4%	
*	60%	1.	Very interesting	56%	(59%)
	34%	2.	Fairly interesting	38%	
	4%	3.	Not very interesting	4%	
	1%	4.	Extremely dull	1%	

Again, this question was taken from the Western Electric

study referred to above and subsequently. Also again, it is informative to list the National Western Electric average responses for comparison:

- | | |
|-------------------------|-----|
| 1. Very interesting | 27% |
| 2. Fairly interesting | 52% |
| 3. Not very interesting | 15% |
| 4. Extremely dull | 4% |

Noted once more is the much higher NCPI employee satisfaction with job interest. Also noted once more is the slightly higher job interest response given by Per Diem over the Per Annum group. For inter-Departmental comparison, the sum of percentages to choices three and four follows, with Per Diem response total to the left and Per Annum to the right in each case:

Industrial: 5% and 6%; Engineering: 2% and 6.8%; Research and Test: 0% and 7%; and Quality: 7% and 2%.

From these results and those of the preceding question's fine breakdown, the pattern seems to exist that the Quality Department has the least satisfied, job-wise, Per Diem group, and the most satisfied Per Annum group. From discussion with a Division Head in the Quality Department, it was determined that a morale problem exists with the Per Diem people in that Department as regards pay. Steps are being taken in the Department, within the framework of Civil Service regulations, to obtain an increase in pay of the Group III ungraded workers by writing new job descriptions. These show how the skills and knowledge called for in an inspector surpass those required by a regular machinist or radio mechanic. It is

expected that a pay differential will be held justified as a result of this study, and the problem may be expected to be gradually overcome. Another sidelight of this problem was the transferring of certain categories of Per Annum employees to ungraded, or Per Diem, positions, in order that higher rates of pay for the same amount of work involved could be paid.²⁵ The above comprise the major facets of the Quality Department's morale problem, according to the supervisors contacted, and progress is being made gradually but effectively toward the solution.

Again, NOPI management should not be lulled into the feeling that no need for improvement in this area exists merely because of NOPI's responses to job interest being significantly higher than Western Electric's. However, the writer considers it a tribute to NOPI that its showing is so much more favorable than that of a nationally recognized leader in private industry.

Question Number 15. The amount of "paper work" I do on my job, considering the type of work I do, is

	3%	0. No answer	0.8%	
	42%	1. Very little	11%	
*	46%	2. Necessary and reasonable	68%	(52%)
	8%	3. More than seems necessary	17%	
	0.8%	4. Excessive	3%	

The Western Electric study response to a similar question, "How do you feel in regard to the amount of routine

²⁵See footnote 2 concerning Per Diem and Per Annum pay systems.

clerical effort involved in your work?" was, again on the National average:

- | | |
|------------------------------|-----|
| 1. Very little required | 7% |
| 2. A reasonable amount | 34% |
| 3. More than seems necessary | 40% |
| 4. An excessive amount | 17% |

A comparison of these figures seems to belie the American folklore about government work and "red tape" going hand in hand. Again NOPI comes out far ahead of Western Electric. Still, a combined total of responses three and four, on the Cranance Plant-wide poll, was twelve per cent, which still is not as good as it could be. How to reduce this twelve per cent more nearly to zero is a challenge that all supervisors at NOPI should consider, each in his own area. An analysis might well show that a better balance of paper work among over-worked and under-worked employees can be achieved readily.

Perhaps a few possible factors for the large differences in responses between NOPI employees and those of Western Electric might be mentioned. One such might be that the records kept by Western Electric are more numerous and in much finer detail, requiring more people to involve more clerical effort than for generally similar types of work at NOPI. Another might be that government workers assume that their jobs will require more paper work than do private industry's employees. Perhaps one of the reasons the employees at NOPI feel more favorable about the amount of paper-work they do than do the Western Electric people may be that

the reason behind the paper-work is made clearer to them through better communications, and they therefore accept it as more nearly necessary and reasonable than do the less-well-informed Western Electric employees. The writer cannot state what the facts actually may be. However, on the overall comparison of results, NOPI seems to distribute the paper work load in a more efficient and effective manner than does Western Electric.

Among Departments at NOPI, a combined total of percentage responses to choices three and four breaks down as follows:

	Percentage Response to Choices	
	3 and 4	
	Per Diem	Per Annum
Industrial	3.9%	21%
Engineering	2%	19%
Research and Test	6%	19%
Quality	25%	25%

Quality, due to the nature of the inspection function, requires considerable paper-work in order to maintain records. However, it appears that the work load requiring paper work may be out of line for the people in the Department, both Per Diem and Per Annum. Possibly this is a situation which cannot be corrected; however, 16% of the Per Diem employees in Quality and 5% of the Per Annum employees stated that they did very little paper work, so a balancing of the load might be indicated.

Question Number 16. As to my personal work abilities,

I feel my job

	3%	0.	No answer	1%	
	8%	1.	Fails to use them	8%	
	36%	2.	Uses some of my main abilities	37%	
*	35%	3.	Uses most of my main abilities	41%(37%)	
	18%	4.	Uses all of my experience and abilities	13%	
	0%	5.	Is too difficult	0.2%	

The question as phrased in the Western Electric study resulted in the following responses:

1.	My job fails to use my main abilities	21%
2.	My job fails to use some of my main abilities	44%
3.	My job uses most of my main abilities	27%
4.	My job uses all of my experience and abilities	8%

On this response, NOPI as a place of employment seems to satisfy its workers better than does Western Electric. This question seems to be a reflection on the placement and utilization of employees so as to derive best results for the organization in terms of employee abilities, skills, and knowledge. Everyone's general education and experience gained through just ordinary living includes more broad development than is generally utilized solely in his job area. However, when the needs of the individual in his job are carefully matched to his abilities to perform the functions of his job, his satisfaction in holding and doing his work are likely to be higher than when he has more ability than his job calls for, or his job calls for more ability than he has.

Various studies, among them that by Fond and Bills,²⁶ show that workers perform best when placed on jobs where their main abilities and intelligence are matched by the difficulty of the job. If the job is too mis-matched with the worker abilities, quits occur, turnover results, and over-all cost of operation thereby increases.

Continued careful emphasis on employee placement within the NOPI organization is indicated in order to bring this relatively high group feeling of utilization of some, most, or all personal work abilities to an even better level. The Departments were fairly evenly distributed about the average responses on this question. The extremes in the Per Annum group were found to "uses all my experience and abilities" in the Engineering Department, with only 8%, and in the Quality Department, with 26%. The extremes for the Per Diem group were also located in these two Departments, but in inverse order, with the Engineering percentage at 25% and the Quality percentage at only 10%. The writer submits this information only as a fact; his lack of information as to what might cause this situation precludes making any specific comments as to what the reasons for it may be.

Validating Data Concerning Turnover and Absenteeism.

Figures 10, 11, and 12 follow. These show NOPI's yearly turnover since 1947; monthly turnover 1952 through March,

²⁶E.A. Bills and M. Pond. Referred to by Joseph Tiffin, Industrial Psychology, 3rd. Ed., (New York: Prentice Hall, Inc., 1952), p. 8.



FIG. 10. YEARLY TURNOVER SINCE 1947

TURNOVER

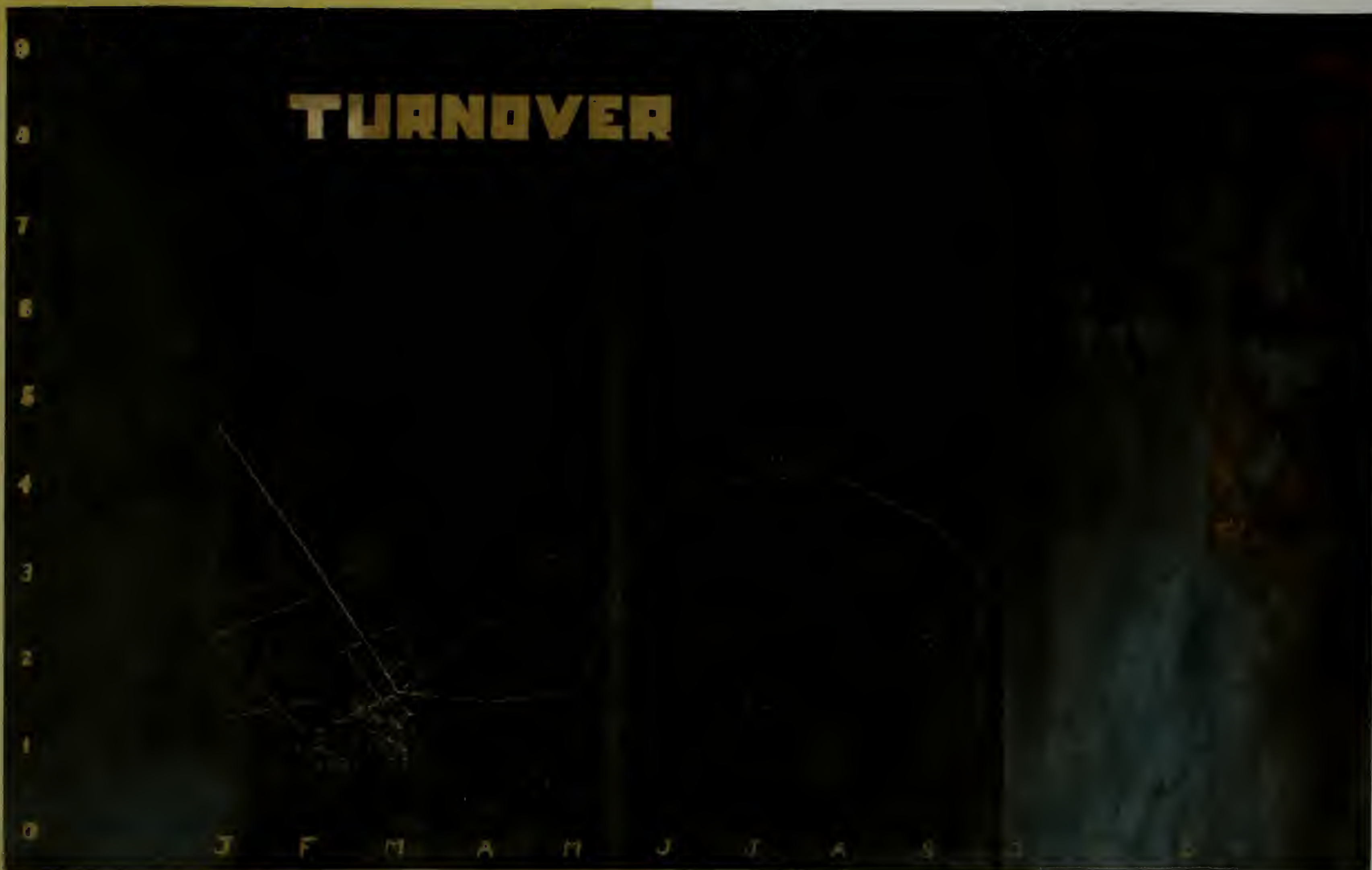


FIG. 11. MONTHLY TURNOVER, 1952 TO 1954

LEAVE CHART

PERCENTAGE OF ACCRUED LEAVE USED PER MONTH FOR

YEARS OF 1952 THRU 1954

- - - - - SICK 1952
 _____ ANNUAL 1952
 - - - - - SICK 1953
 _____ ANNUAL 1953
 - - - - - SICK 1954
 _____ ANNUAL 1954

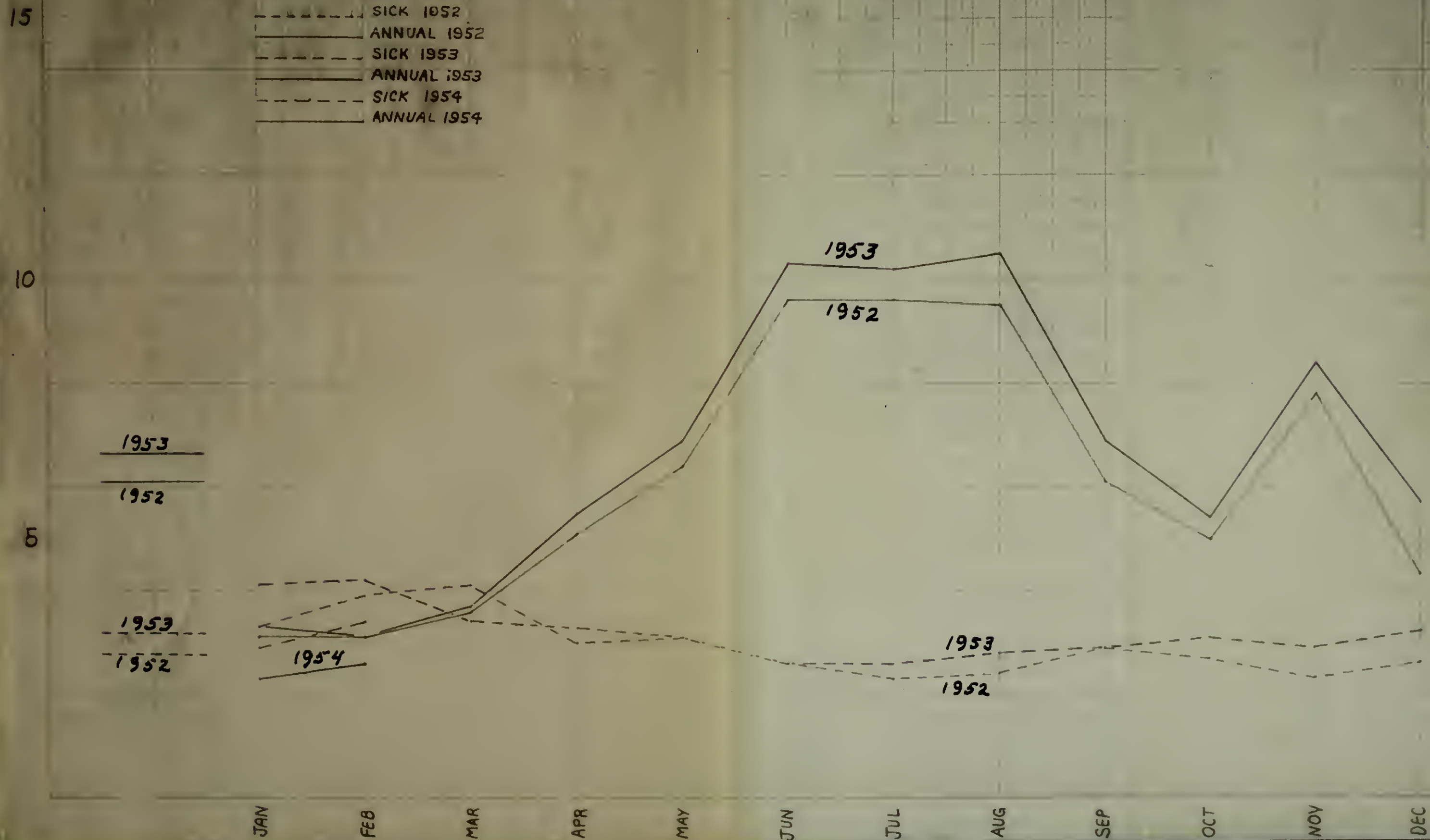


FIG. 12. ANNUAL AND SICK LEAVE, 1952 TO 1954

1954; and percentage of accrued leave used by months by NOPI employees, 1952, through February, 1954, respectively. These figures represent the entire population of NOPI, not just the Departments studied, but they do show the low turnover and low absenteeism rate prevalent at NOPI. Actually, an employee under Civil Service is entitled to certain privileges of sick and annual leave,²⁷ the period varying with the length of service, so that unexcused absenteeism is extremely low. For example, only 1790 hours of unexcused leave, which amounts to the generally used term for "absenteeism", were recorded at the Ordnance Plant during the entire period from January 1, 1953, to January 1, 1954. One man-year of work consists of 2080 hours at NOPI (from which accrued annual and sick leave may be subtracted to give productive, employed hours. Thus, it can be seen that unexcused absenteeism is almost unknown at the Ordnance Plant. Since excused absenteeism is a boundary condition imposed by Civil Service regulations as part of the employment situation, it is in the same category as vacations for workers in private industry, and thus leave, both annual and sick, cannot be taken as an indicator of absenteeism. For the reasons above stated, it is considered that no absenteeism problem exists at NOPI.

In the Departments studied, the turnover was as follows during the calendar year 1953:

²⁷NCPI, 105, op. cit.

	Accessions	Separations	Separation Rates ²⁸
Industrial	284	362	1.77
Engineering	63	76	1.71
Research and Test	20	23	1.51
Quality	37	53	2.32

From the above figures, it can be seen that a somewhat higher separation rate occurred in the Quality Department than in any other. However, representative averaged figures for monthly Separation Rates from January through November, 1953, in private industry are:

1. For Ordnance and accessory manufacturing companies: 4.4;
2. For all reported manufacturing industries in the United States; 4.3.²⁹

On the basis of this comparison, the Ordnance Plan't sep-

²⁸Dale Yoder, op. cit., p. 354 states:
...three types of turnover rates are usually calculated: separation rates, accession rates, and replacement rates...

Each rate is calculated as the number of separations, accessions, or replacements per hundred employees in the work force during a month or year...

Thus, to determine the Separation Rate for the Industrial Department, the following calculation was used: the total separations (362) were divided by the average work force during the year (taken at 1700). This was multiplied by 100 to give 21.3. To get this figure on a gross monthly basis, divide by 12, resulting in a figure of 1.77.

The Separation Rate was chosen so that a comparison to published figures for representative industries' separation rates could be made.

²⁹Monthly Labor Review, Vol. 76, Nos. 5-12, and Vol. 77, Nos. 1 and 2; Table B and B-2.

aration rates seem good, indeed.

An influence on the separation figures listed above was a forced cut in NOPI's station personnel ceiling, which necessitated a reduction in station's working force of 125 employees during 1953. This cut in personnel allowance was caused by budgetary considerations due to reduced Congressional appropriations, and is a situation which sometimes fluctuates widely between rehiring, during a state of National Emergency, and reduction in force during periods of lesser needs. This in itself is a cause for fluctuations in efficiency of any governmental agency, since the employees with the least Civil Service retention standing are the first to be involuntarily separated.³⁰ Sometimes this takes junior key people from an organization; at all events, it causes a reshuffling of people to different jobs as a procedure similar to "bumping" in unions is employed to determine who remains and who leaves. This causes the organization to have reorientation problems and retraining requirements, and breaks up the smoothness of operation until these have levelled off. Oftentimes the work load of an activity remains high for a period when a reduction in force is called for, but, according to NCPI procedures, the transitions are made as smoothly as possible, and, by careful management planning, as efficiently as possible.

³⁰NCPI, op. cit., 170.

Question Number 17. For the most part, my fellow workers in my group are

	1%	0.	No answer	1%	
*	82%	1.	Very friendly and helpful	83%	(82%)
	16%	2.	Fairly friendly and helpful	15%	
	0.9%	3.	Indifferent to me	1%	

The answers to this question reflect the subjective judgment one makes upon observing the people at NOPI; namely, that the employees in general like and respect one another and are proud of their fellow workers. That this is especially true of NOPI can be seen by comparing results with the Western Electric survey:

1.	Very friendly	49%
2.	Cooperative	39%
3.	All right	10%
4.	Indifferent to me	1%
5.	Unfriendly to me	0%

Once again the results show a higher indication at NOPI than at Western Electric. It would appear that NOPI is very fortunate in having extremely good inter-employee relations, for all employees in all Departments responded very closely to the averages shown.

If one should ask whether this favorable attitude toward fellow employees can be considered significant, the following should indicate that it is:

...Most people want to work with people who like them and with people whom they like. Where there is cohesion between employees and where the employees see the goals of the company and their own goals in the same light, productivity can be increased.³¹

³¹Lawshe, op. cit., p. 335.

Question Number 18. When you are first given an assignment, how much information and help does your supervisor give you?

	2%	0.	No answer	3%	
	2%	1.	I never get what I need	1%	
	8%	2.	I seldom get what I need	8%	
*	60%	3.	I usually get what I need	60%	(59%)
	28%	4.	I always get what I need	28%	

No comparative results are available on this question. It can be considered as setting a norm for the Ordnance Plant at the time this study was conducted, and any future appraisals of worker opinion can be related to it. In this question's replies, it is interesting to note that the Per Diem and Per Annum percentages are nearly identical in each choice. It appears that supervisors are alert and helpful on the whole; however, with ten per cent seldom or never getting the information and help they need, there is still room for considerable improvement. Of some interest is the fact that 100% of the Research and Test Per Diem employees answered that they "usually" or "always" got the information and help they needed. Although the other Departments were not far behind, the next closest, Industrial, had only 92% in these two categories. The Per Annums in each Department totalled very closely to the total Per Annum average results given. Groups reporting the highest response to "never get what I need" were Quality Per Diem with 5%, and Industrial Per Annum with 3%.

A write-in space for comments was provided on this question. Some of the submitted remarks are listed for information. Since only a few questionnaires, relative to the survey population, listed the various different remarks, their significance is not considered as reflecting any assessable or general trends. Therefore, a detailed discussion of each comment is not considered worthwhile. Still, a listing of the write-ins, followed, in parentheses, by the number of questionnaires submitting the general comment, may be of value in helping NOPI management to improve the overall area of supervision in the Plant.

1. More help and guidance need for inexperienced personnel. (2)
2. Must seek some information in other departments. (2)
3. Must ask for the information. (10)
4. Supervisor is not specific enough. (6)
5. Poorly explained by supervisor. (4)
6. Supervisor doesn't have the information either. (8)
7. Have to dig it out for myself. (3)
8. Supervisors good for information and help. (2)

Question Number 19. Are you satisfied with the credit you receive from your supervisor when you do a good job?

	2%	0. No answer	2%	
*	25%	1. Entirely satisfied	22%	(34%)
	32%	2. Quite satisfied	39%	
	26%	3. Only fairly satisfied	24%	
	15%	4. Not at all satisfied.	12%	

These responses indicate that much improvement in the administering of verbal credit by supervisors to employees

is desirable. Two separate authorities have this to say:

. . . People want to do those things which are rewarding to them and inhibit those things which bring punishment in their wake. Furthermore, people feel pleasure in the anticipation of reward, and they feel anxiety and insecurity in the anticipation of punishment. It is amazing to what extent these facts are forgotten in the administrative practices of many business managers. Most work situations are devoid of rewards of any kind. Many are actually punishing. Small wonder that employees in such situations develop feelings of anxiety and insecurity which directly influence their work efforts.³²

and:

A fact not realized by many . . . is that it is entirely possible for an employee to become lost and buried in a large industrial plant, even while he is doing his job well . . . The general principle that we emphasize here is that praise and rewards are in many (if not most) cases more potent than reproof as a motivating factor and will almost always have a better effect on employee morale. Supervisors will do well not only to know this, but to use it in their day-by-day operations with their men.³³

Of the many supervisors contacted and interviewed during this NOPI study, nearly all exemplified good human relations knowledge of the importance of giving credit where due, and emphasized the value of the spoken word of praise for jobs well done. Since, due to the magnitude of the study, time prevented interviewing all levels of supervision, mostly high-level people were representative of

³²B. B. Gardner and D. G. Moore, Human Relations in Industry, Rev. Ed., (Chicago: Richard D. Irwin, Inc., 1950), p. 360.

³³Tiffin, op. cit., pp. 483-84.

those talked with. It is believed by the writer that an awareness of the importance of credit given promptly where due should be striven for in training first-line and intermediate supervision levels. This should gradually help overcome this employee lack of satisfaction as to credit received when they believe it due.

Department-wise, it was noted that Per Diem employees totalled 54% on "entirely" and "quite" satisfied in the Industrial Department, 75% in Engineering, 72% in Research and Test, and 61% in Quality. Per Annum totals for these two responses was: Industrial, 56%; Engineering, 59%; Research and Test, 75%; and Quality, 63%. It would therefore appear that Research and Test supervisors are more generous in dispensing credit when due, in general, than are the other Departmental supervisors.

Question Number 20. In regard to his technical know-how, I believe my immediate supervisor is

	1%	0.	No answer	0.9%	
*	35%	1.	Highly capable	34%	(34%)
	25%	2.	Quite capable	32%	
	18%	3.	Good enough for his job	15%	
	18%	4.	Lacking in some necessary respects	16%	
	3%	5.	Not qualified for his job	3%	

This question was based on another listed in the Western Electric study, but was broken down finer to determine if any difference in reply would result between employee thought concerning technical ability, and human relations and manpower-management ability in their supervision. (This latter area will be discussed in question

21.) The Western Electric question was phrased, "I believe that my immediate supervisor is . . .", and the response results to this question follow:

1. Highly capable	20%
2. Quite capable	31%
3. Good enough for his job	13%
4. Lacking in some necessary traits	27%
5. Not qualified for his job	7%

The above results may be compared by the reader; again, an evident better situation results at NOPI. However, in order to be impartial, the reader should also compare the results occurring in the next question to the Western Electric results above.

Planty, McCord and Efferson state:

The general function of the supervisor is to promote the integration of workers, machines, materials, and time, so that a given job can be accomplished efficiently and economically . . . In one form of production, as in all others, the supervisor is the person who must coordinate physical materials and intangible forces to get the job done on time and according to specifications . . . To perform . . . successfully a supervisor must have a thorough understanding of the job he is expected to do. He must have an adequate knowledge of methods, materials, and machines. He must see clearly the relationship between his unit and the organization as a whole. Above all, he must have an understanding of the people with whom he is working, and the ability to enlist their full and willing efforts in the accomplishment of the job to be done.

A large part of our current supervisor training is based on the assumption that technical or mechanical skill in any given occupation is the first requisite for successful supervision. Yet experience has demonstrated time and time again that no amount of operating skill, of engineering or business administration background, can alone insure a man's success as a supervisor. However skilled a man may be in a craft, trade, or profession, he will fail in supervision if he does not have the ability to get other people to perform work for him, and perform it

willingly. In every case, the supervisor's principal function is human leadership.³⁴

For the purposes of this study, despite a showing which is better than that resulting from the "Inside Western Electric" survey, the NOPI response would indicate that much room for improvement is present and that a marked improvement would be desirable. With a total of 39% of Per Diem employees and 34% of Per Annum employees indicating their supervisors' technical know-how was only such that he was "good enough for his job" or worse, additional supervisory technical training seems indicated. Since a large and rather complete technical library is maintained at NOPI, perhaps more use could be made of it by supervisors. Perhaps more formal instruction in classroom sessions would be helpful. In this regard, NOPI conducts, among several other programs, a Supervisory Development training program. Presently enrolled are forty-seven people, and the course is to be expanded in the near future. This instruction is given to groups of supervisors at about the same organizational level, and consists of a one-hour session once a week. However, due to the general diversity of technical areas at the Ordnance Plant, utilization of this program for technical training would probably be less effective in aiding the individual

³⁴E. G. Planty, W. S. McCord, and C. A. Efferson, Training Employees and Managers (New York: The Ronald Press Company, 1948), pp. 170-71.

supervisors to increase their technical competence than would self-study and informal help from other more qualified supervisors within his job area. Thus, possibly as a result of this study's findings, it is suggested that NOPI management inform its supervisors that the people under them feel that they are not technically as well qualified as they should be, and encourage individual study to rectify this condition.

Comparing the results of this question on a Departmental basis gave the following break-down:

	Total Percentage Responses to Choices 4 and 5	
	Per Diem	Per Annum
Industrial	21%	21%
Engineering	20%	20%
Research and Test	22%	9%
Quality	20%	18%

Only in the Per Annum group in Research and Test was there an appreciable difference in the total response to these choices, a more favorable response than in any of the other groups. Still, even 9% is high, while the general figure of about 20% for the other groups is excessive.

Question Number 21. In regard to his ability to handle and get the most out of his work group, I believe my immediate supervisor is

1%	0.	No answer	1%	
5%	1.	Not qualified for his job	5%	
23%	2.	Lacking in some necessary respects	25%	
18%	3.	Good enough for his job	18%	
25%	4.	Quite capable	30%	(27%)
* 27%	5.	Highly capable	21%	

These results are very similar to those obtained in the Western Electric study enumerated in the preceding question's discussion. In both the Per Annum and Per Diem groups, a need for much review of supervisory practices and remedial action by NOPI management is indicated in order to bring employee opinion to a higher favorable level. It would appear that NOPI supervision is more "production-centered" than "employee-centered". Lawshe explains these terms and emphasizes that in at least one study of office workers,³⁵ productivity varied according to the desire to do the job, which was encouraged more by employee-centered supervisors than by those who were production minded. As he states it:

. . . It appears that the extent to which supervisors are employee-centered is associated with how well they are liked. In other words, the human and humane supervisor who has respect for his employees is better liked than the one who is eternally "pushing" for production, regardless of human welfare. Taking productivity into account, the office study . . . clearly demonstrated that employee-centered supervisors get higher production from their employees than do production-centered supervisors.³⁶

Since no practical measure of productivity was available for all groups of employees surveyed at NOPI, the effect of the response of the employee opinion toward supervision as it affects productivity cannot be assessed here. Suffice to say, indications are that employees are not as well satisfied as regards supervisor ability to handle and

³⁵Reported in Human Relations Series 1, Report 1 (Ann Arbor, Michigan: University of Michigan, 1948).

³⁶Lawshe, op. cit., p. 334.

get the most out of the work groups that would seem possible. In this area, the Supervisory Development training program would appear to be an excellent medium for improving supervisor skills in handling people. In view of the fact that the levels of employee opinion expressed on this question are so much lower, relative to other comparisons with similar Western Electric opinions, than any of the others evaluated thus far, it would seem that this area of supervision needs considerably more emphasis than it has received to date.

All Departments, in both Per Annum and Per Diem groups, indicate this need nearly equally with responses very close to the averages presented above.

In order to compare unfavorable response on this question as to that presented at the end of question 20, the total responses by Departments for choices one and two are presented below:

	<u>Total Percentage Responses to Choices</u>	
	<u>1 and 2</u>	
	Per Diem	Per Annum
Industrial	29%	32%
Engineering	22%	32%
Research and Test	28%	25%
Quality	26%	24%

It can be seen from the above that employees in both personnel groups in all Departments are more unfavorable in their responses to the human relations and leadership abilities of their supervisors than to their technical abilities. Although the degree of unfavorability isn't too much greater, the trend expressed is.

Question Number 22. Usually, when I discuss a grievance with my supervisor

	14%	0.	No answer	3%	
*	48%	1.	It is settled in a fair manner by him	51%	(48%)
	9%	2.	He passes it up the line where it is usually settled in a fair manner	12%	
	7%	3.	He passes it up the line, but it is seldom settled to my satisfaction	6%	
	8%	4.	He tries to help me but he is helpless to correct the situation	13%	
	6%	5.	He ignores the complaint or at least does nothing about it	5%	
	7%	6.	He settles it his way, but not in a fair manner	3%	

Undoubtedly, the large percentages indicated for "no answer" are due to the fact that the questionnaire provided no choice to the effect that the employee had ~~had~~ no grievance. A considerable number of employees in all Departments wrote this statement in on the comment space provided for this question. It is interesting to compare this range of percentage response with the official record of grievances reaching the second or higher stage at NOPI. The Employee Relations Division Head stated that during all of 1953, only six grievances went to the second or higher stage. In 1954, to and including March 31st, only two grievances had been presented to the second stage of the procedure.

The grievance procedure for Navy employees is prescribed by NCPI 80.³⁷ Four stages in the presentation of grievances

³⁷NCPI, op. cit.

for solution are provided for. Policy dictates that these steps be made known to every employee and that the Grievance Procedure Chart shall be posted conspicuously at all activities. The first stage is for the individual to present his grievance to his immediate supervisor, at which level a large majority of grievances should be settled. If a settlement is not reached, the grievance may be taken to the employee's shop master, senior civilian supervisor, or division director. Both the employee and the division director have full recourse to the Industrial Relations Department for help in checking references, determining procedure for the hearing, and so on. At the hearing, witnesses may be called and the employee has the full right to present his side of the case. A record of the hearing shall be maintained. The employee shall be informed of all factors pertaining to management's position in the case, and shall have the right to reply thereto. The employee will be informed of the division director's decision on the case at this level, in writing, which either sustains the employee's appeal or the first step supervisor's decision. If the matter still hasn't been settled to the employee's satisfaction, he may appeal for a decision by the Commanding Officer, which is the third step procedure. At this level, a Grievance Advisory Committee is convened to study the case thoroughly, and presents its recommendations arrived at as a result of study

of the records of previous hearings, information gained during a hearing it conducts, and any further examination of witnesses, to the Commanding Officer, together with any minority reports, for his decision. If the employee still isn't satisfied with the decision, he may take the grievance to the fourth stage, by appeal to the Under Secretary of the Navy via the Commanding Officer. All papers in the case are forwarded, and the Under Secretary of the Navy renders the final decision on the grievance, terminating the levels to which a grievance may be taken.

In view of the employee responses to the question, and in view of the extremely small number of grievances reaching the second stage of the procedure, it would appear that employees seldom bother to initiate an appeal to the second stage, even though not wholly satisfied with the decision rendered by their immediate supervisors. Whether this is due to fear of reprisal by the supervisor, or just sheer inertia and wariness against preparing the necessary written and/or oral presentation is not known by the writer. However, this seems to be a case in point where the policy as written and the practice as carried out do not seem to be in full accord. Nevertheless, this area seems to present quite different recorded facts from tabulated opinion. Since all Departments and both Per Annum and Per Diem employee groups give reasonably similar responses, this condition is not related to any one group or to any one De-

partment, but seems to be Plant-wide. A Departmental comparison of responses to choices one, five, and six will be shown below:

Percentage Responses to Choices

	1		5		6	
	Diem	Annum	Diem	Annum	Diem	Annum
Industrial	47%	46%	6%	9%	7%	5%
Engineering	52%	47%	5%	5%	8%	3%
Research and Test	78%	62%	0%	1%	0%	1%
Quality	52%	60%	9%	1%	6%	4%

In the above, we note that Research and Test supervisors in both Per Diem and Per Annum groups seem to satisfy their employees by settling grievances satisfactorily more often than do those in any other Department. Also noted is the fact that in this same Department fewer employees wrote in unfavorable responses, as evidenced by choices five and six.

The expressions by the employees may reflect "gripes" over which the supervisors and NOPI management has no control, such as salary ranges under Civil Service. They may reflect suggestions or ideas for change that are not properly part of the grievance procedure. Still, especially after noting some of the write-ins, it does appear that first line supervision tends to block or ignore considerable grievances. Here again is an area where greater employee familiarization with regulations and procedures, plus supervisory training in the field of handling grievances, would seem worthwhile. The role-playing technique might be utilized in the supervisory training program, so that some of the foremen and branch heads can help visualize

the employee's point of view at closer range. The response to this question may be an indicator of why NOPI employees answered the preceding question as relatively unfavorable as they did.

There follows a sampling of the range and type of write-ins submitted for this question. The number in parentheses following the comment indicates the number of questionnaires containing the statement. Again, the number on any one comment (except the "I have no grievance" one) is small, but the ideas expressed should help NOPI Management to focus on potential weak or troublesome areas and thereby help increase over-all employee satisfaction and reduce frustration and anxiety in a significant number of Ordnance Plant employees.

1. Overtime not handed out fairly. (1)
2. My supervisor loses his temper and becomes quite belligerent when confronted by a grievance. (1)
3. She does anything to get out of work. (1)
4. If you don't cater to him, he doesn't do anything for you. (2)
5. Always get same answer: 'If you're not satisfied, ring out your time card'. (1)
6. Lots of fear of reprisal. (3)
7. Blames anything on Company policy. (1)
8. His hands are tied because of outside friendships with higher supervision. (1)
9. Too much politics. (1)
10. Avoids question about raise due fear of his boss, so forgets it. (1)
11. There isn't any fairness exercised where Negroes are concerned. (2)
12. Hostile and arbitrary attitude at higher levels. (1)
13. He is the best I have worked for in my 30 years. (1)
14. He is one of the finest, most fair of supervisors. (3)
15. Waste of time to talk to him. (1)
16. Unduly long waiting period to settle problems. (1)

17. Monthly grievance sessions in Inspection have been discontinued and I feel they should be in effect. (1).
18. My supervisor is the type we need here. (6)
19. He has the reputation for being too suspicious and distrustful in this regard. (1)
20. I have had no grievance. (106)

From the above, one can see that a very wide range of thought is expressed, although some of it is highly favorable. Still, though isolated in most cases, the trend of write-ins suggests that first-line supervisors in all Departments, at least in some cases tend to block or disregard the intent and policy on grievances laid down by NCPI. In this same regard, the Industrial Relations Handbook has this to say:

. . . Employees are quick to sense the truth when a foreman forms the habit of attempting to squelch grievances. It makes little difference which method he employs. He can joke and laugh and tease the men out of their grievances . . . Or he can adopt a stern, unbending attitude toward grievances and tell his men and women that they ought not to complain, that he will "see about it," or bring it up at a future meeting, or that what they ask is impossible. In either case, the result is the same. The grievance procedure is useless.

. . . If the management will make it clear to every foreman that grievances are to be treated seriously, foremen will not attempt to squelch them. Foremen must be taught to anticipate and to expect a certain number of grievances and to settle them fairly and promptly. More than that, they must be taught that grievances are not necessarily a reflection upon the foreman's ability or his skill in handling men. To put it plainly, do not allow a grievance procedure to put the foreman "on the spot". Do not let foremen feel that too many grievances will result in a black mark against them, for if they do feel this way they will find a method of squelching grievances.³⁸

³⁸Industrial Relations Handbook, op. cit., p. 179.

Question Number 23. Do you think that your supervisor tries to be fair and impartial to each employee (for example, in assigning work, granting requests, getting each to do his share, etc.)?

	2%	0.	No answer	2%	
	22%	1.	Sometimes	13%	
	45%	2.	Usually	43%	(44%)
*	31%	3.	Always	42%	

Again, this response would seem to indicate that supervisory leadership could stand considerable improvement. In this question, a rather large difference is exhibited between Per Diem and Per Annum responses to choices one and three, with the Per Annum supervisors being more highly rated by their employees. The industrial Department seems to be lowest in a finer break-down comparison among the four Departments:

Department	Question Choice Response					
	1		2		3	
	Diem	Annum	Diem	Annum	Diem	Annum
Industrial	22%	19%	46%	48%	30%	29%
Engineering	12%	13%	52%	42%	35%	43%
Research and Test	6%	7%	56%	38%	39%	55%
Quality	26%	11%	33%	41%	40%	48%

The results of this question, general as they are, indicate no specific levels of supervision where management action could be taken; however, it is submitted that the mere awareness on the parts of supervisors that they are considered less fair and impartial than they could and should be, might help improve the situation by causing reflective thinking and conscientious striving for improvement. One possible reason for this employee feeling that

some supervisors are considerably less than fair and impartial may be that a considerable number of end-of-questionnaire write-ins mentioned the presence of various kinds of cliques. This factor will be discussed at greater length when the terminal comments are analyzed and discussed.

Question Number 24. How often does your supervisor discuss your job performance with you?

3%	0.	No answer	4%
18%	1.	Only when something goes wrong	13%
14%	2.	Once a year	19%
7%	3.	At least every six months	5%
23%	4.	Seldom or never	22%
* 36%	5.	Often enough, but not on a regular schedule	36% (36%)

Two of these response choices reflect adversely on NOPI from both a human relations standpoint and from the standpoint of poor compliance with instructions as set forth in Section 130 of NCPI. These two are "Only when something goes wrong", and "seldom or never". With nearly one-fourth of NOPI employees seldom or never getting a knowledge of their results, a tendency occurs for them to sink into the rut of a less than full effort complaisance, or possibly a "who cares" attitude toward their work. Lawshe says:

Knowledge of results may consequently become an incentive for increased effort and output. When such is the case a clear understanding of what is to be achieved in the job and in addition the constant satisfaction of knowing how far one has gone toward attaining a work goal will facilitate the trainee's progress toward that goal.³⁹

³⁹ Lawshe, op. cit., p. 39.

Tiffin further states:

The general principle of job training is that new employees will improve very slowly -- if, indeed, they improve at all -- unless they are provided with systematic and accurate information on the quality of their work. Provision for furnishing new employees with definite knowledge of results should be an integral part of any training program.⁴⁰

On the other hand, appraising the employee of his results only at a time when something goes wrong, and never giving him praise when due on a good job or for a usually steady job performance that is taken for routine by the supervisor due to long association, is not conducive to good employee-supervisor relations. The beneficial effect of praise as a motivating agent has already been mentioned.

Furthermore, NCPI states that proper performance requirements be made known to the employee and that the employee be notified, currently and promptly, how he is doing in relation to those requirements. "Rating" the employee as to performance rating is required formally on an annual basis, and the employee is to be informed of his rating, while "appraising" an employee concerning his performance should be done on a where and when desirable, continuing basis, usually orally and informally.

It is therefore suggested that steps be taken to impress on line supervisors the necessity for frequent discussion of performance with the people working under them, especially in regard to better than average performance.

⁴⁰ Tiffin, op. cit., p. 285.

Interestingly enough, this same general recommendation was considered desirable on the basis of response to the Naval Ordnance Laboratory questionnaire, referred to several times previously. Evidently, there are certain areas in both employment situations which government employees, although separated geographically, react to similarly.

The Departments, when intercompared on responses to question choices one and four show results as follows:

	Response Choice Number			
	1		4	
	Diem	Annum	Diem	Annum
Industrial	20%	23%	22%	17%
Engineering	5%	8%	20%	27%
Research and Test	0%	16%	39%	26%
Quality	11%	18%	23%	12%

It appears that all Departments need improvement in performance appraisal communication, with Industrial especially high on the list of presenting its employees with negative information, and Research and Test and Engineering not discussing performance often enough.

Question Number 25. Do you feel free to approach and talk to your immediate supervisor about your promotion possibilities?

4%	0.	No answer	3%	
49%	1.	I always feel free to talk this over	52%	(50%)
20%	2.	I usually feel free to talk this over	23%	
16%	3.	I usually hesitate to talk this over	13%	
11%	4.	I never feel free to talk this over	9%	

It appears that the Per Annum employees feel freer to talk over promotional possibilities than do the Per Diem workers, but both groups responded to the choices in a very similar manner. About one-fourth of both groups are hesitant or rather afraid to approach and talk over this subject with their supervisors. Possibly this is due to a natural feeling of inferiority or perhaps it is because the supervisor has indicated that he doesn't want to discuss it with the people in his group. No very large differences were apparent among the Departments on this question. Here again is a question which seems to point up the need for more human relations training for supervisors; other than this broad statement, the writer can make no recommendations. Again, this question's responses can form a basis for further NOPI study to detect improvement or other modification in employee opinion.

An inter-Departmental comparison on the basis of response to choices three and four follows:

	Percentage of Responses for Choice			
	3		4	
	Diem	Annum	Diem	Annum
Industrial	17%	12%	11%	15%
Engineering	15%	15%	5%	7%
Research and Test	6%	13%	11%	6%
Quality	17%	10%	7%	9%

Question Number 26. NOPI as a place to work, compared to other activities or companies that I know about or have worked for, is

0.8%	0. No answer	2%	
5%	1. Just average	10%	
33%	2. Better than average	38%	
* 61%	3. One of the very best	50%	(58%)

On the sample ballot given to test the final NOPI questionnaire, a choice was provided for "worse than average"; since no one in the sample checked that category, it was deleted from the final OPINION form.

Per Diem employees seem to feel that NOPI is a better place in which to work than do the Per Annum group, but both rate it highly. Evidently, their job satisfaction, working conditions and environment, and feelings toward fellow employees overshadows both group's feelings toward supervision enough to cause them to be highly favorable toward NOPI. This general feeling was obtained from the NOL employees in the Naval Ordnance Laboratory survey, too, again showing a parallelism between the two establishments. The exact figures from the NOL survey are not available, unfortunately, for a finer comparison. An inter-Departmental comparison showed that both groups in Research and Test and the Per Annum Engineering group rated NOPI lowest, while Engineering Per Diems and Quality Per Annuns rated NOPI highest. By Departments, the breakdown was as follows:

	Percentages of Response to Choice					
	1		2		3	
	Diem	Annum	Diem	Annum	Diem	Annum
Industrial	5%	8%	33%	32%	61%	57%
Engineering	2%	14%	32%	42%	68%	43%
Research and Test	17%	10%	39%	49%	44%	38%
Quality	4%	1%	32%	26%	63%	73%

As another criterion, we can compare a similar question from the "Inside Western Electric" survey results to those obtained at NOPI:

- | | |
|-------------------------|-----|
| 1. One of the very best | 8% |
| 2. Better than average | 38% |
| 3. Just average | 41% |
| 4. Worse than average | 7% |
| 5. One of the worst | 2% |

This comparison shows a truly remarkable difference between NOPI and Western Electric. Still, at NOPI, 10% of its employees feel that it is "just average", and that represents room for improvement. The writer can offer no suggestions here that have not already been made.

Question Number 27. Do you feel that the management of NOPI, down to and including your immediate supervisor, delegates enough responsibility and authority to get the best results from its employees?

- | | | | | |
|---|-----|---------------|-----|-------|
| | 3% | 0. No answer | 4% | |
| * | 52% | 1. Yes | 44% | (49%) |
| | 20% | 2. No | 30% | |
| . | 24% | 3. Don't know | 23% | |

The individual Department responses to choices one and two of this question are listed below:

	Question Response Number			
	1		2	
	Diem	Annum	Diem	Annum
Industrial	51%	50%	21%	22%
Engineering	52%	34%	20%	37%
Research and test	56%	46%	11%	26%
Quality	53%	59%	21%	26%

It can be seen that the Per Diem groups in all Departments felt similarly as to both "yes" and "no" responses, except that Research and Test was slightly above the

average in the affirmative and slightly below average in the negative responses. In the Per Annum groups, Engineering was considerably above in the "no", while Quality came out with the highest "yes" percentage. How much of the "halo effect", or as it might better be called here, a "devil's horns effect", of the Engineering Department reorganization on the results of this question is impossible to assess, but it probably contributed to the low relative relationship.

Over-all, it appears that employees feel that considerably more authority and responsibility could be delegated than is being done at the present time. A comment space was provided on this question, and a tabulation of a representative sample of these write-ins will be presented below, giving some clues to the reasons why the response was as tabulated.

In regard to responsibility and authority, Lansburgh and Spriegel state:

To place fixed responsibility accurately eliminates vertical gaps or overlaps of responsibility along the lines of supervision which have been laid down. The more responsibility that can be definitely given to subordinate executives, the easier it will be to develop substitutes for each executive. The more responsibility for co-operation with other members of the organization is made definitely a portion of the responsibility assigned to the individual member of an organization, the easier it will be to co-ordinate operation of the various phases of the business.⁴¹

⁴¹R. H. Lansburgh and W. R. Spriegel, Industrial Management, 3rd Ed., 9th Printing, (New York: John Wiley & Sons, Inc., 1946), p. 65.

They further state:

The fact that men are accustomed to stand on their own feet, operating of course within certain well-established practices develops a group of minor executives who are capable of meeting unusual situations and emergencies. This encourages the full utilization of the sound principle, that decisions should be made at the lowest level within the organization where the facts are available and competence exists to decide.⁴²

The writer believes that a careful analysis by supervisors concerning the personalities and abilities of the people in their work groups, plus a searching examination of items in ~~their~~ work load that could perhaps be delegated to subordinates would have a very desirable, long-range effect at NOPI. It would serve to help develop subordinates and would further save the supervisor's time for matters requiring his personal attention, effecting a more desirable distribution of work loads for subordinates and supervisors alike. Of course, the responsibility of the supervisor for the actions of his subordinates is absolute, so careful training and a gradual program leading up to the desired result is required.⁴³ One indicator which might be considered as a danger signal that a supervisor is not delegating enough work and therefore not keeping well enough informed on over-all matters is the too frequent statement, "I haven't got time . . .".

⁴² Ibid., p. 109.

⁴³ A brief and pertinent article on this subject, "Train 'em to Delegate Responsibility", by Lester F. Zerfoss, appeared in Factory Management and Maintenance, Sept., 1953, p. 262 et. seq.

Following is a listing of sample write-ins on Question 27, with the number of questionnaires listing the same or nearly-same comment indicated following the statement and enclosed in parentheses:

1. Lines of authority and responsibility not clear enough. (3)
2. Overlapping responsibilities cause confusion in management. (2)
3. My supervisor does; his does not. (1)
4. Do not use it in proper manner to get best results from employees. (3)
5. Yes, when not hampered by Navy or Civil Service rules. (1)
6. Everything must go through Top Management. (5)
7. Too much red tape. (5)
8. Not enough uniformity in orders and instructions among Departments. (6)
9. Too many bosses. (1)
10. Too much buck passing. (4)
11. Very little technical help given. (2)
12. Absolutely not! (3)
13. Responsibility yes; authority no. (5)
14. Most trouble here is from Branch Head down; top management does a pretty good job. (1)
15. Lack of know-how in top supervision. (3)

Again, these comments reflect only a very small number of questionnaires, compared to the survey population; however, their trends may be significant and indicate possible areas for management's attention and correction.

Question Number 28. When I run into a difficult problem on my job

	2%	0.	No answer	5%
*	81%	1.	I know how far I'm supposed to go before asking my supervisor for help.	72%(78%)
	7%	2.	Occasionally I find I do not ask my supervisor for help soon enough	6%
	10%	3.	It isn't clear to me whether I should ask for help or go ahead on my own	16%

This question cannot be compared percentagewise to any other survey of opinion. It can be considered as setting a mark of measurement to which any later change in employee opinion can be compared.

In general, it can be said that, probably due to the nature of their work, Per Diem employees generally know how far to go and what to do a larger portion of the time than do Per Annum people. A large majority of both groups feels competent to judge how far to go before requesting supervisor assistance. It is considered only natural that a small percentage of people either waste time while trying to arrive at the solution to their particular problem before consulting their supervisor, or are possibly engaged in such a line of work that the dividing line between going ahead on their own and asking for supervisor help is very broad. However, it is mainly in the third response that possible significance attaches. The reasons for the relatively large response in this category may be several. Among them may be the fact that the supervisor is autocratic rather than democratic, and a possible feeling of fear or anxiety prevents the worker from approaching him. Or, it may be that the worker isn't sufficiently trained to really know just how far to go on his own. Or it may be that the work is of such a nature that the supervisor doesn't know too much about the particular problem, either, so that the employee feels he can accomplish as much on his own as by consulting with his supervisor.

At all events, regardless of the reason, a possible remedy for the choice three group would be a dual program of continued training for both employees and their supervisors.

As might be inferred from the nature of their work, the Research and Test Per Annum group's response to choice three was smaller (7%) than in any of the other three Departments (18% each). The Per Diem responses for each Department were very similar and close to the over-all average.

Question Number 29. Are you given a chance to offer your ideas when decisions are to be made which fall within your job responsibility?

	3%	0.	No answer	2%	
	10%	1.	Seldom or never	6%	
	15%	2.	Only occasionally	12%	
*	50%	3.	Yes, usually	51%	(49%)
	21%	4.	Yes, always	30%	

The over-all participation in making decisions seems to be quite high. This is considered a favorable response, in view of the numerous studies which have been conducted which showed a direct relationship between productivity of a work group and the amount of participation engaged in by the work group in arriving at the decisions affecting it. As Lawshe puts it, in unpublished lecture notes at Purdue University, "There are certain areas of freedom in which employees can and should participate, such as in sharing information, recognizing alternatives affecting the supervisor's decision, making recommendations which can influence

the supervisor's decision, and actually making decisions. Each of these areas of freedom is smaller than the one preceding it, especially the decision making area. A supervisor cannot, for example, abdicate his responsibility, violate laws and regulations, and disregard confidences in letting his work group members participate. However, the job of the supervisor is to ask himself, "Am I permitting the highest level of participation in this particular situation that I can on this area of freedom -- can I make this decision better alone, or with the help of my subordinates?"

It is suggested that this concept be discussed with supervisors in the Supervisory Development training program, and its implications tried out in practice to determine results.

Departmentally, Industrial had the smallest combined percentages for choices three and four for both Per Diem and Per Annum employees, both being 69%. The Research and Test Per Diem total was 94%, the highest of any group.

Question Number 30. How do you feel about the advancement you have made at NOPI to the present time?

	3%	0.	No answer	4%
	34%	1.	Very satisfied	25% (32%)
*	31%	2.	Fairly satisfied	31%
	12%	3.	Neither satisfied nor dissatisfied	10%
	14%	4.	Somewhat dissatisfied	21%
	6%	5.	Very dissatisfied	7%

Departmentally, the combined totals of responses four and five were as follows:

	Per Diem	Per Annum
Industrial	20%	23%
Engineering	20%	31%
Research and Test	6%	26%
Quality	15%	20%

Here again is seen the slight trend toward favorable answers from the quality Per Annum group and the Research and Test Per Diem group. Whether due to intrinsic ambitions, educational background, or what not, the over-all figures show that the Per Diem employees are slightly more favorable in their responses toward advancement made than are the Per Annum people. The figures show that ambition in both groups tends to make the employees desire to advance further than they have in about one-third to one-fifth of the cases. Jobpromotion channels are set forth and publicized. NCPI 60 sets forth the policy and procedures regarding promotions. Since Civil Service is national in scope, one possible means for a dissatisfied person to employ in attaining a higher position is to take examinations and submit his application for a higher job in another activity. The perpetual problem of not having enough openings in the organization so that everyone can be a "chief" is present at NCPI as it is everywhere. In a way, it is a tribute to the NCPI environment that so many people are dissatisfied with their advancement to date. This indicates a highly motivated, interested employee group. On the other hand, where the needs of the individual to advance cannot be fulfilled, that individual may tend

to go elsewhere, either in government service or to private industry, thereby leaving a gap in the organization which must be filled. And even the "chiefs" may be unhappy because they cannot be "heap big chiefs"!

In short, the writer is not competent to suggest any specific remedies for this situation. So long as the available openings in the organization are filled according to law, regulation, and policy, and so long as this is done in a fair, unbiased manner, the greatest good to the largest number of employees will result. Although there will be much unhappiness and dissatisfaction on the part of a considerable number of employees as to advancement made, this feeling need not overbalance the many other good factors in their working environment at NOPI.

Comments submitted in the write-in space to this question showed a lot of feeling on this subject. Listed below are some representative samples of those received, together with the number of questionnaires on which they were submitted. As with a majority of comments submitted in this survey, the individual number of similar comments here was small relative to the survey population; still, management would do well to analyze the range of responses and take indicated remedial action where feasible.

1. Supervisors insist that money is not important -- that all engineers are missionaries! (1)
2. Well pleased with every detail. (1)
3. Exceptionally alert employees are penalized under Civil Service. (6)
4. Woman feels not recognized at NOPI. (5)

5. Have been treated fair and square. (1)
6. No advancement in 12 years. (1)
7. GS-11; can go no further⁴⁴ (2)
8. Have reached top of my grade. Can go no further. (2)
9. I am misclassified. (3)
10. Held back due politics and favoritism. (12)
11. I was by-passed for supervisor tho' examined and qualified. (3)
12. Dissatisfied that salary level seems to be below Private Industry. (2)
13. Engineering reorganization will probably hurt this. (3)
14. Was told not on job long enough for promotion altho' I have 10 years compared to average of 3. (1)
15. My services are often used, but not paid for. (1)
16. Have seen others hired in for more money but with less experience. (2)
17. Ex-CI's are given priority in some jobs that command a greater rate of pay. (1)
18. If you earn it, you get it. (1)
19. For the work done here, this plant should be the best paid in the community. (1)
20. Job technically fine; financially, damned poor. (2)
21. I should do more brown-nosing. (2)
22. My chances are poor by not being a Lukas-Harold man. (1)
23. Civil Service can't compete with private industry for top engineering talent. (2)
24. Very little advancement for Negroes regardless of capabilities. (2)
25. Plenty of praise, but no advancement. (1)
26. I have refused promotion, due to age and health. (1)
27. Too much time in grade. (4)
28. No advancement in 9 years -- something is wrong. (1)

From the above list, it can be seen that at least a few employees seriously believe that bias, favoritism, and prejudice enter into the NOPI promotional picture. It would be well for management not to gloss over the implications apparent, but to investigate and remedy situations

⁴⁴"GS" refers to the General Schedule classification of Per Annum employees. GS-1 is the lowest level under the Schedule, while GS-15 is the highest level employed at NOPI.

where these morale-destroying elements are determined to exist.

Question Number 31. How do you feel about your chances for further advancement at NOPI?

	3%	0.	No answer	3%	
	26%	1.	I feel my chances are poor	30%	
	39%	2.	There is some chance	42%	(39%)
*	29%	3.	I feel my chances are good	24%	
	4%	4.	I like the job I have and do not care to advance further	2%	

Herein reflected is that more than one-fourth of all workers at NOPI do not feel they have much chance for promotion. The general discussion under Question 30 applies here, but the write-in comments to this particular question disclose the prevalence of a large number of people who feel that bias, prejudice, and favoritism are very strong factors in the NOPI employment situation as regards chances of advancement. In a Departmental breakdown, the response to choice one was as follows:

	Per Diem	Per Annum
Industrial	27%	30%
Engineering	10%	33%
Research and Test	17%	29%
Quality	23%	21%

Again, it can be seen that Research and Test Per Diem employees and Quality Per Annum employees, by their relatively low percentage response to this question are more favorable than any other group, except the Per Diem Engineering workers, who are the most favorable. Perhaps an analysis of supervisors in these areas will prove fruitful in determining ways and means to increase favorable employee opinion in other locations.

Of interest may be the fact that the Naval Ordnance Laboratory survey of employee opinion also brought forth a rather wide-spread feeling that favoritism played too great a part in selection for promotion. The following is quoted from the Commander's report: "The survey further indicated that there was a feeling that favoritism is being exercised by some supervisors of the Laboratory and that the supervisors who played favorites were not considered worthy of the trust of their employees."

A representative sample of employee write-ins on this question follows, again showing the number of persons submitting the same or a similar comment in parentheses following the statement:

1. Promotion is too slow. (8)
2. Too slow under Civil Service. (5)
3. GS ratings for help too low. (1)
4. Favoritism. (16)
5. Civil Service ceilings. (9)
6. Too few positions for women. (4)
7. Not enough advancement for women. (5)
8. Cannot get transferred. (2)
9. Too much politics and regulations, not enough merit. (3)
10. I don't stand in with the higher-ups. (2)
11. It's who you know that counts. (2)
12. If woman, must be young and good looking to advance. (1)
13. Leadingman advances not filled from register. (1)⁴⁵
14. Wrong politics. (2)
15. Not in clique. (4)
16. Wrong religion. (3)
17. I don't wear the ring. (1)
18. I am not a Mason or a Catholic. (1)
19. The Personnel Department needs its mouth washed out for fibbing. (1)
20. Not a Mason. (3)
21. Position is underpaid, but otherwise entirely to my liking. (1)

⁴⁵The ungraded (Per Diem) workers' supervisory job titles run Snapper, Leadingman, Quarterman, Chief Quarterman, Foreman, and Master from low to high.

22. Unless supervisors start to treat people as people rather than a race, not much chance. (1)
23. I feel it is strictly up to me -- the opportunity is there. (3)
24. Promotion is cut and dried before an examination is given. (1)
25. I try very hard -- I have never failed. (1)
26. My chances are poor because my supervisor doesn't necessarily advance one by his work but by likes and dislikes. (1)
27. I find it disheartening to work under the promise of a step increase in 1 year and then after working 6 months, have waiting time extended to 78 weeks. (3)
28. Not enough emphasis on seniority in advancement. (1)
29. My supervisor holds grudges even in and out of department. (1)
30. I feel my chances are good. If there were no chance, I would terminate my employment. (1)
31. The better jobs are controlled by non-veterans. (1)
32. I don't have enough glamor. (1)
33. Rates are not available. My work is mostly on short run pilot models and cannot be shown on my job description. Under present regulations I can describe only the work I am doing at the time my Job Description is written. (1)
34. Some people write a better job description than others, and therefore get a higher rating. (1)46

The above sampling of comments illustrates an employee feeling, although admittedly on a small scale, of favoritism, bias, and prejudice concerning their promotional possibilities. More will be said about this expression of opinion on this general topic when the questionnaire-end write-ins are discussed.

Question Number 32. The place where I do my work

2%	0.	No answer	2%
* 52%	1.	Is well arranged and laid out for the work I do	46% (50%)
38%	2.	Could be improved on somewhat	40%
8%	3.	Is poorly arranged or crowded for what I have to do	12%

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Employees write their own position descriptions in accordance with recent directives.

The answer considered significant in this question, other than to assess over-all employee satisfaction with his work place, was choice three. Departmentally, the Research and Test employees are by far the most critical of their work places, as can be seen from the following breakdown of the response to "poorly arranged or crowded":

	Per Diem	Per Annum
Industrial	9%	13%
Engineering	10%	8%
Research and Test	28%	29%
Quality	1%	9%

The Engineering and Quality Per Annum employees seem best satisfied, while the Quality Per Diems evidently are the most satisfied group of all as regards lay-out of working space. Although no comment space was included under this question, a few were inserted anyway, stating that their dislike was based on the reason that their work space was "crowded" or "noisy". As previously mentioned, a good many Research and Test employees work in the separately housed Laboratory building; this may well be a contributing factor to their general dissatisfaction with their work place. Only one specific criticism of the Laboratory was written at the end of the questionnaire. It stated that the lack of windows in the lab made one feel that he was working in a prison. It is probably due to the variation in projects worked on and the general nature of research that the Research and Test people are so much at variance in their opinion with the other Departments.

No specific remedy for this situation can be submitted by the writer. The awareness of the fact that it exists may help management to take some specific action to improve conditions, however.

Question Number 33. Is your work interrupted by lack of materials, tools, supplies, or instructions?

	3%	0.	No answer	4%	
	30%	1.	Often	19%	
*	54%	2.	Seldom	57%	(55%)
	13%	3.	Never	20%	

Ideally, there would be a 100% response to the "never" choice. Actually, in any organization there are bound to be shortcomings in scheduling, coordinating, procuring supplies and materials, and in passing information. However, with no other criterion than subjective judgment of the responses given, the writer believes that a vast increase in productivity is possible by bettering the conditions implied here.

Below is listed a Departmental comparison of responses to choice one:

	Per Diem	Per Annum
Industrial	32%	15%
Engineering	30%	20%
Research and Test	22%	17%
Quality	16%	21%

Interestingly enough, the Industrial Department contains the best response of any Department for the Per Annum workers, yet the worst response for the Per Diem personnel. All Departments indicate that there is a need for improvement in both groups' work as regards freedom from time-consuming and production-cutting interruptions.

Comments written-in on this question include the following, together with the number of submissions:

1. Lack of materials or parts. (34)
2. Lack of or improper tools. (17)
3. Lack of supplies. (12)
4. Lack of, or poor clarity of, instructions. (9)
5. Inefficient (or slow, or complexity of) supply system. (12)
6. Lack of planning. (2)
7. Unnecessary interruptions. (2)
8. Dissemination of information from Bureau down not as good as it should and could be. (2)
9. Bench too high -- feet off floor although on ledge -- causes strain. (2) (Both female workers)
10. Need more space for handling required materials. (1)
11. Methods are biggest bottleneck. (1)
12. Many of our machines need repair. (1)
13. Improper storage sometimes hampers location of parts. (1)
14. Many times jobs are started without the necessary material needed to complete it. (1)
15. Lack of coordination between departments. (1)
16. Nearly 60% of my time is wasted searching for materials and supplies. (1)
17. Our drill press has been in need of repairs for 2 years. (1)
18. Time lost waiting on checking devices. (1)
19. Cannot obtain aid to do routine work. (1) (This from a supervisor, incidentally.)
20. Shortage of lathe accessory equipment. (1)
21. Too much red tape -- using a giant system to do small jobs. (1)
22. Commercially purchased items delay, mostly. (1)
23. No crib in Research to handle material available; tools scattered. (1)
24. Not enough right tools. (1)

The above is representative of the comments submitted.

It seems to the writer that most of the items mentioned could be easily and quickly corrected by reporting conditions to supervisors for rectification. Of course, some of them are not so easily settled. In several interviews with high-level supervision, the writer determined that in

every instance this top supervision was striving to improve methods and processes which would smooth operation, reduce bottlenecks, and permit better coordination of employee effort. However, it seems that group meetings with first-line supervision would permit most of these small but efficiency-destroying items to be brought to light and remedied. There seems to be at least some evidence that workers are reluctant to pass such information to first-level supervisors. Suggested training of supervisors in human relations and psychological principles should tend to alleviate this implied employee distrust of, or at least lack of confidence in, certain areas of NOPI supervision.

Question Number 34. The way I feel about methods improvement and work simplification is

5%	0.	No answer	7%
10%	1.	I haven't thought much about them	10%
* 55%	2.	Whenever I find a better way to do my job, I tell my supervisor about it	54% (54%)
7%	3.	I use the Beneficial Suggestion Program when I find a better way to do my job	4%
25%	4.	I often find simpler and better methods for doing my job and use them, but don't bother to tell anybody about them	25%

The majority response to this question is considered to be in keeping with general procedure in any organization. The supervisor being the next person in line to the employee, the natural tendency in most cases is to inform one's supervisor when a better or easier method for doing a job is discovered.

The relatively large responses of "no answers" and "I haven't thought much about them" seems indicative that the terms were unfamiliar to about 15% of the surveyed employees. This means that fifteen employees in every hundred either haven't thought much about the method and manner of doing their jobs, or have never considered departing from the job method as it was taught them or as they first hit upon it. Of course, where standard methods are prescribed, it is incumbent upon the employee to follow them, but should he discover a better method for accomplishing the desired result, it will make for possibly more efficiency throughout if the better method is brought to light and shared.

Some discovered methods of doing jobs are so applicable to large numbers of processes or work groups that Plant-wide or Navy-wide savings may result from their application, or intangible benefits to a large number of employees may ensue through their adoption. In these cases, the employee may receive financial reward or official commendation if he submits his suggested improvement to the Beneficial Suggestion Program for evaluation, and if it is accepted. Therefore, a small but definite percentage of employees were expected to respond to this choice. However, the main untapped wealth of ideas and better methods that never comes to light is reflected in the response to choice number four, where one-fourth of both the Per Diem and Per Annum employees indicate they often

find better methods for doing their jobs, but don't bother to tell anyone about them. It is precisely for the purpose of drawing forth and communicating these locked-in ideas and methods that a work simplification training program can be initiated. Allen H. Mogensen discovered the fundamental base of Method Improvement and formulated it as follows: "One a person really knows how and why a job is done, and studies it with the desire to improve, he will find ways and means to improve it!" Mogensen then went on to develop techniques of Method Improvement, which he called "Work Simplification".⁴⁷

Regarding the Work Simplification Plan in effect at the TAPCO Division of Thompson Products, Mr. Q. N. Croth has this to say:

Although the tangible savings produced by the program are important, I believe one of the contributions that we have obtained from the course is its value as a tool to promote better human relations. Perhaps this thought surprises you and you would quote the number of projects turned in and the thousands and thousands of dollars saved annually by the program. If your program is a good one, it is certain to save money, but actually the program is more than a money saver. It is a means to an end and in many cases that end is JOB SATISFACTION.⁴⁸

On the basis of responses by both personnel groups and in all Departments, the institution of a Plant-wide, long-term program of training employees in Work Simplification techniques would prove profitable at NOPI.

⁴⁷For one reference on Work Simplification, the reader is referred to an article, "Work Simplification", by W. C. Zinck, Supervision, Dec., 1953, pp. 9-12.

⁴⁸From the same address referenced in footnote 9.

To conclude this question's discussion, a list of write-ins submitted on this question is presented:

1. No one seems to care about Work Simplification. (2)
2. My supervisor doesn't like to be told by me. (10)
3. My supervisor won't pass the information on. (5)
4. He seldom pays any attention to the cheap help. (2)
5. Red tape prevents adoption of ideas. (3)
6. (One responsee, who checked "don't bother to tell anyone" said this:) This eliminates unnecessary paper work. (1)
7. Method improvements are covered by reports and circulated. (1)
8. Sometimes our suggestions are ignored. (1)
9. But he tells his supervisor it was his idea. (1)
10. We need cooperation to speed ideas. (1)
11. Too many departments can block suggestions. (1)
12. Most of the time they pay no attention to a woman's suggestion. (1)
13. A Work Simplification course needs to be started here. (1)

This sample of comments again gives the range of responses submitted by a relatively small number of employees. Again apparent is the trend for certain supervisors to resent suggestions coming from his work group, or refusing to pass them up the line without adequate explanation to the employee. The much referred to human relations training of supervisors seems to be one method of modifying these adamant attitudes on the part of at least a few NOPI supervisors, evidently mostly on the first level. For an inter-Departmental comparison, responses to choices two and four will be presented:

Percentage of Responses₂ to Choice₄

	Diem	Annum	Diem	Annum
Industrial	54%	48%	23%	27%
Engineering	65%	54%	28%	25%
Research and Test	67%	61%	0%	19%
Quality	57%	60%	19%	26%

From the above, it is seen that the Research and Test people tell their supervisors somewhat more often than any other Department's employees. Also, they hold back less information than the people in any other Department. How much of this is due to the nature of their work, and how much is due to the "permissive atmosphere" of the Department is not known.

Question Number 35. Considering the kinds of products we make at NOPI, I feel our production control and present manufacturing methods

	3%	0.	No answer	5%	
	5%	1.	Cannot be materially improved	3%	
*	50%	2.	Could be improved in some instances	35%	(44%)
	15%	3.	Need improvement in many situations	24%	
	27%	4.	I do not know	32%	

This question was not intentionally phrased to "put the finger on" the Production Control and Manufacturing Methods Divisions; it was put in in order to determine employee opinion concerning the over-all production of hardware, as the manufactured products going to the Fleet are referred to, in the NOPI establishment. It was expected that a rather large number of employees would not consider themselves competent to state an opinion on this question, which turned out to be the case. Also it would be expected that improvement in some instances is always desirable, no matter how good the situation. Since this question's responses cannot be related to those of any similar activity,

they establish a base for future NOPI comparisons only.

In order to evaluate the response "need improvement in many situations", a sample of submitted comments will be presented. NOPI faces the most difficult type of production control, due to the fact that its products are made to such close tolerances and allowances, the products must be nearly perfect when completed, so many different small parts comprise an assembly, so many different, short-run jobs are being processed through the Plant at any given time, and the material requirements and completed specifications are so rigorous. For example, every time fifty additional knots of speed are built into an aircraft type using NOPI firecontrol equipment, vibrational characteristics, inertia characteristics, and other considerations enter into how well the finished product will operate, and sometimes major modifications must be made to the basic type of equipment. The assemblies must operate at 60 degrees below zero as well as they do at room temperature, and they must also operate at one hundred and forty degrees as well. A single pin backing out of a component part might cause the loss of an aircraft in combat. Solder connections must be such that they will not vibrate loose under terrific strains and accelerations. These are a few of the basic considerations which complicate production control and manufacturing methods at the Ordnance Plant. Thus, it can be seen that due to the complexity of product

and difficulty of performing the machining and assembly operations, the control and manufacturing functions are extremely difficult. It is considered a tribute to the Divisions performing these tasks that they do turn out acceptable assembled units as a matter of routine. Few private firms are able to enter the field of aviation ordnance fire control equipment due to their inability to produce products of the high standard required; thus NOPI performs a unique and vital function in engineering, testing, and manufacturing during peace time. The know-how developed and the pilot runs made on small-lot bases will go far toward helping private industry to overcome bottlenecks and problems of production in the event of war, when cost lids are removed. It should be understood by the reader from the above that NOPI does not compete with private industry for work that could be done equally well by private industry. It is in the business because it can do the job well, whereas an extremely small segment of private industry can do the job at all, and that segment has its hands full of work at the present time.

With the above information given to acquaint the reader with the type of work to be controlled and the general complexity of the product, some of the comments which follow may become more meaningful:

1. Lack of coordination from engineering to production. (2)
2. Too much overlapping among departments. (2)

3. Too much tension, especially among inspectors. (1)
4. Stored parts not arranged properly. (1)
5. Too close tolerances causes excessive scrap. (1)
6. Have more material and parts available before releasing job to production. (2)
7. Assembly and Engineering need closer liason. (2)
8. Too many one-track minds. (2)
9. Plant manager or over-all authority for entire Plant needed. (1)
10. Mechanics like to see how the work is performed. (2)
11. System good, but people not qualified. (3)
12. Need improvement in keeping blueprints up to date. (1)
13. Schedule work to machine shop so all parts are available when a job is started in assembly. (1)
14. Production is controlled by a high-quality standard. (1)
15. Time estimates on job are very inaccurate. (2)
16. Clashing personalities. (1)
17. Scheduling and material control could be greatly improved. (1)
18. Technical paper is too slow in getting from Engineering to floor. (1)
19. Too many chiefs -- not enough Indians! (1)
20. Plant is well organized and instruments okay. (1)
21. Even small quantity urgent jobs are geared as mass jobs. (1)
22. Notice dollar value of the scrap run per year! (1)
23. Representatives from assembly and inspection should be allowed to sit in at engineering conferences to smooth out difficulties and assist in the decisions. (1)
24. Production control should be separated from manufacturing methods. (1)
25. Failure to send NOPI men to outside conferences hurts over-all Plant efficiency. (1)
26. Need improvement in handling finished parts. (1)
27. Time and cost estimating need improvement. (1)
28. Need bonuses for exceeding quotas. (1)

The above shows the range of response on the write-ins.

Continued training is indicated for even experienced craftsmen have trouble in meeting the tolerances. In general, better coordination among divisions and Departments seems to be indicated. Also, a smoother coordination in releasing jobs when the materials are available appears desirable.

In conclusion, it was noted that the Quality Per Annum response percentage to "need improvements in many situations" (33%) was the highest inter-departmentally, while the Quality Per Diem employee response (10%) was the lowest.

Question Number 36. For my type of work, the equipment I use at NOPI is

2%	0.	No answer	4%	
7%	1.	In need of replacement	3%	
3%	2.	Not as good as most places	3%	
62%	3.	Better than in most places	62%	(62%)
* 26%	4.	The best obtainable	28%	

In this question, 10% of the Per Diem employees and 6% of the Per Annum people indicate that their equipment is below par. Considering the general type of work done at NOPI, this is considered excessive. However, a large majority of both groups, 88% Per Diem, 90% Per Annum, indicate either better than average or the best. On an inter-Departmental comparison, the following responses to choices one, two, and the totals of three and four were noted:

	Percentage of Responses by Choice					
	1		2		3 and 4	
	Diem	Annum	Diem	Annum	Diem	Annum
Industrial	7%	10%	2%	3%	88%	82%
Engineering	10%	0.8%	5%	3%	85%	92%
Research and Test	11%	0%	0%	6%	89%	93%
Quality	9%	2%	4%	0%	84%	93%

It is suggested that, in view of the appreciable percentage of employees who believe their equipment to be below par, an informal survey of employees be made by supervisors to assess the locations and conditions of the

equipment considered sub-standard. Over-all productivity at NOPI would doubtless profit by the removal of obsolete or ineffective equipment, and its replacement by less worn or faster-producing equipment. Further, employee relations might be improved as a result of management's interest in the individual employee.

Question Number 37. How do you feel about motion and time study?

5%	0.	No answer	6%	
37%	1.	I don't know enough about it to say	36%	(37%)
22%	2.	Due to the many different products we make, it wouldn't be at all applicable in any of our production operations	11%	
* 24%	3.	Even though we make many different products, it could be used to advantage in at least some of our production operations	25%	
12%	4.	I feel we could apply it to many of our production operations to good advantage	21%	

This question was included in the questionnaire mainly to get some assessment of government employees' reaction to time and motion study. Up until recent years, and dating back to about 1914, a clause was inserted by Congress into every Federal Appropriation Act, which forbade the use of the appropriated funds for conducting time and motion studies at government activities. This distrust of motion and time study as a tool for studying jobs, determining the best way to do the job, and for getting time estimates for how long it should take an average employee

to do a certain job, resulted in general from a lack of basic knowledge of what was to be done and an unfounded fear of the unknown. As a result, even today, there are a large number of people in government employ who hardly realize that such a field exists. However, as the response to this question at NOPI indicates, there is gradually coming a realization that motion and time study can be an extremely valuable tool for management when properly applied. It can reduce fatigue, improve methods, increase production, and set standards of accomplishment for evaluating human endeavor in many fields, but especially where a rather simple, repetitive job is performed. In ensuing years, it is expected that considerable emphasis will be given to time and motion study at government activities, although it is in its infancy today.

Concerning the "human factor" involved in motion and time study, Mundel states:

. . . a motion and time study department or an individual engaged in performing such functions not only must execute the necessary technical activities in a sound, accurate fashion, but also actively take part in furthering the integration of motion and time study into the organization by:

1. Submitting adequate financial reports of its activities to management, properly crediting co-operating, participating, or originating individuals or groups.

2. Actively seeking equitable solutions for possible hardships connected with technological changes.

3. Disseminating motion and time study information throughout the whole organization, not only to overcome the normal resistance of people affected by it, but also to aid everyone in the organization to co-operate in finding better ways of doing work. Formal training courses, foreman conferences, information via the house organ, and person-to-person explanations of each issue

are desirable. The ideal situation occurs when innovations are originated, or at least participated in, by persons as close to the point of application as possible.

Also, because of "the human factor," all members of the organization should actively undertake to understand the procedures and techniques of motion and time study, and to equip themselves to take part in cooperative action for finding equitable ways of raising our standard of living through more effective production without increased effort, and without hardship.⁴⁹

For a finer breakdown on this question by Departments, response to "would not be at all applicable", choice two, and the combined totals of choices three and four, "applicable to at least some" and "applicable to many", will be presented:

	2		3 and 4	
	Diem	Annum	Diem	Annum
Industrial	22%	11%	36%	41%
Engineering	22%	10%	40%	51%
Research and Test	22%	4%	28%	42%
Quality	21%	23%	35%	50%

No general inferences will be drawn here by the writer, except to point out that the higher general response to the possibility of applying motion and time study to NOPI by the Per Annum employees, as exhibited in choices three and four, is probably due to their difference in general educational background, plus their greater familiarity with current technical literature. The relatively lower response within the Per Annum group shown by Industrial to these choices is probably due to the closeness of the people in that Department to the working environment to which motion and time study would be first applied.

⁴⁹M. E. Mundel, Motion and Time Study, Principles and Practice, (New York: Prentice-Hall, Inc., 1952), p. 20.

Employee comments written-in under this question included the following:

1. We are not given enough set-up time and in many instances, not enough time to run a job. (1)
2. Motion and time study would help methods and efficiency. (1)
3. Could use it only in order to find better methods. (1)
4. Too short of production runs to use it. (7)
5. Too close of tolerances for jobs to be timed to the minute. (2)
6. Motion economy instruction badly needed at NCPI. (2)
7. Would be better than presently-used estimated times, which vary from time to time. (4)
8. Use it for establishing standard times, but not for setting rates. (1)
9. Could eliminate some short-run jobs into longer jobs if planned better. (1)
10. For selected operations, yes. (3)
11. Would be good in machine section. (2)
12. Would be good especially in assembly. (1)
13. A lot of time and money would be saved, for I have seen it done at other places. (1)
14. Much is lost in quality now because of time requirements. (2)

These are representative of those comments submitted. As can be seen, employee comment varies widely concerning the worth of motion and time study as applied to NCPI. In regard to estimated times, which are set by the use of previous records, experience of the planner, and common sense, referred to in comment 7 above, the closeness of actual hours taken to run a job and the hours scheduled for its running forms the basis for determining the Industrial Department's efficiency. Figure 13 portrays both the relative efficiency of the Department and the number of overtime hours worked, measured in thousands, for the period 1952 through 1953. The formula used for determining

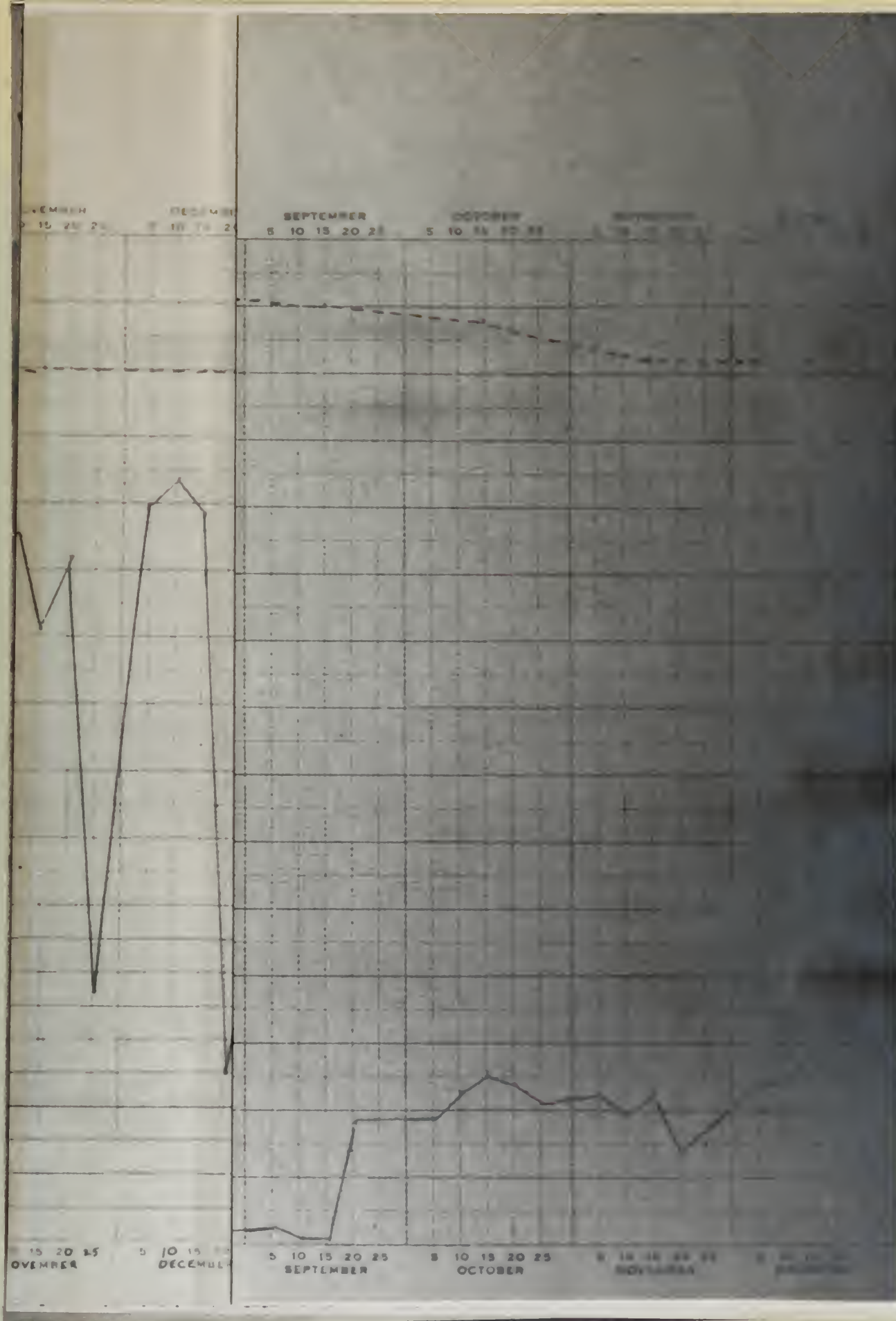
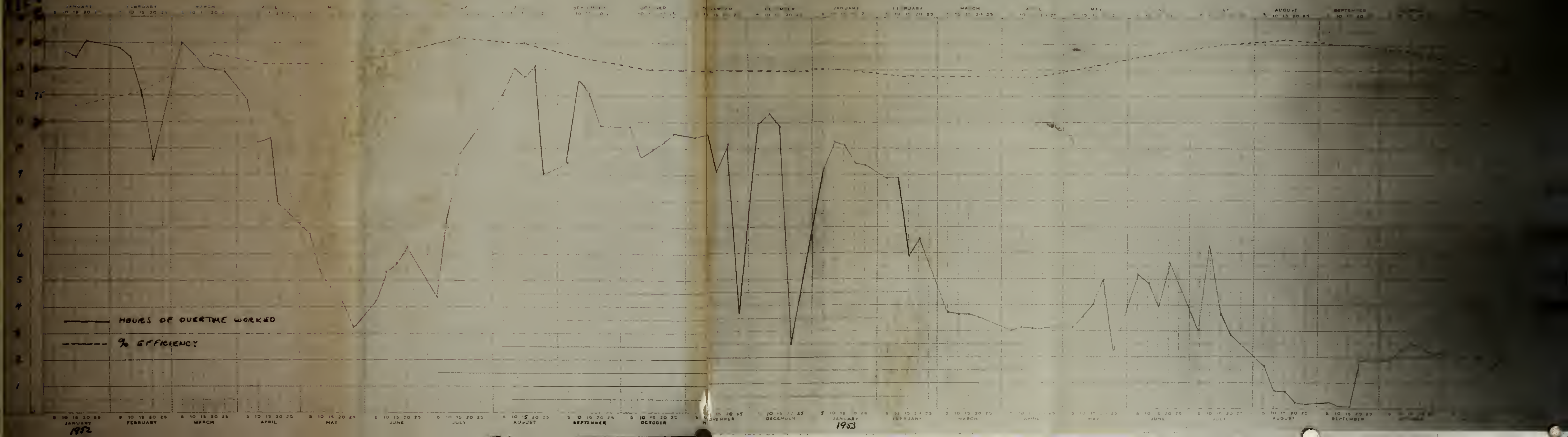


Fig. 13 - INDUSTRIAL DEPARTMENT RELATIVE EFFICIENCY CHART



relative Department efficiency is to take the percentage by which the actual hours exceeded the estimated hours for all jobs, including machining, overhaul, and assembly, for a given working week, add 100% to this, and divide the total into 100%, to give the relative efficiency. For example, if actual hours exceed estimated hours in the Department during a selected week by 26%, we would divide 1.00 by 1.26 to get a relative efficiency of 79% for that week. On Figure 13, a trend can be noted whereby a large amount of overtime hours causes a reduction, with a slight lag-time involved, in relative Departmental efficiency. This is admittedly a rather crude measure of productivity, but in absence of a better one, is the one employed. Assembly operations and overhaul jobs most often show the greatest discrepancy between estimated hours and actual hours, due to the inherent difficulties of the jobs as performed at NOPI.

Question Number 38. The forms I use in my job are

	5%	0.	No answer	4%	
*	50%	1.	Well designed for filling in necessary information	64%	(54%)
	5%	2.	Poorly laid out for filling in necessary information	7%	
	2%	3.	Poorly laid out and require unnecessary information	5%	
	39%	4.	I do not use forms in my job	20%	

It can be seen that of employees at NOPI who use forms in their jobs, a large majority are satisfied with them, both in the Per Diem and the Per Annum categories. The major significance in this question concerns choices two

and three, and the response thereto. Only 7% of the over-all Per Diem people feel the forms they use in their job area are poor, while 12% of the Per Annum people feel this way. Departmentally, the breakdown on this question's total response to choices two and three was as follows:

	Total Choice 2 and 3 Response	
	Per Diem	Per Annum
Industrial	7%	12%
Engineering	2%	12%
Research and Test	0%	14%
Quality	8%	11%

There seems to be no general difference among the responses of the Per Annum employees; the relative differences among the Per Diem people would seem to result as a natural consequence of the jobs performed. Thus, the inspectors in quality and the producers in Industrial would be expected to have more contact with manufacturing process and control paper than would the Per Diem employees in either Research or Engineering. The fact that so many employees in both categories feel that their forms could stand improvement would be worthy of further study by people concerned in the various areas. "A paper form is a standardized arrangement for recording and transmitting facts. Records of transactions in industrial operation, sometimes called paper work, are made on forms."⁵⁰ Due to the fact that so much of industrial communication is conducted through the medium of forms, it is imperative that the forms used

⁵⁰L. P. Alford and J. R. Bangs, Production Handbook (New York: The Ronald Press Company, 1950), p. 1337.

transmit information accurately, and that they provide for as much ease in placing information on to the form and in taking information from the form, as possible. Therefore, the form should be designed for the user and his equipment; if typewritten, spacing of the form should correspond to the spacing of the typewriter. Regarding forms in general, Yoder⁵¹ suggests that a continuing and critical appraisal be made with these representative questions in mind:

1. Is the form necessary? 2. What is the purpose of the form? 3. Are the arrangement and content appropriate to that purpose? 4. Are all items in it relevant and necessary? 5. Could information be secured or recorded more readily or accurately by other means? 6. Are questions or items clear, sharp, understandable by those who are to create this record? 7. What do users report as to its effectiveness or shortcomings?

Before leaving this question, the percentages of people not using forms in their jobs might be of interest, as reflected in choice four:

	Choice 4 Response	
	Diem	Annum
Industrial	40%	17%
Engineering	52%	21%
Research and Test	56%	39%
Quality	6%	7%

Research and Test, as would be expected, has the least contact with forms, while Quality has the most.

⁵¹Yoder, op. cit., pp. 538-39.

Question Number 39. I feel that the time lost in handling raw materials and semi-finished products at NOPI is

	4%	0.	No answer	5%	
	12%	1.	Excessive	16%	
*	36%	2.	Normal	31%	
	7%	3.	Very low	3%	
	42%	4.	Don't know	46%	(43%)

By Departments, for personnel responding to choices one, three, and four, the results were as follows:

	Percentage of Responses to Choice					
	1		3		4	
	Diem	Annum	Diem	Annum	Diem	Annum
Industrial	11%	13%	7%	3%	40%	37%
Engineering	12%	19%	2%	2%	40%	48%
Research and Test	11%	13%	6%	0%	56%	65%
Quality	16%	15%	7%	10%	43%	33%

As expected on this question, a majority of employees indicated that they "did not know". Of those who did check a choice other than number four, it would be assumed that at least some of these did not really know, probably having no criterion for comparison. However, it is of interest that a higher percentage of response indicated that the time lost was excessive rather than that it was very low. As is by now clear to the reader, the delicate, small components of NOPI's products require many individual operations to fabricate and assemble. Rapid production is secondary to acceptable production; still it is believed that a greater awareness of the importance of proper and rapid handling of materials on the parts of management and worker alike at NOPI could cut lost time in materials

handling considerably. Often a highly skilled machinist may utilize a considerable portion of his productive time carrying trays of parts back and forth to central locations, or even to locations that, while relatively near his machine, still consume a considerable length of time during the progress of a day. This has the dual effect of increasing labor costs and cutting down productivity. Or an overly-large tray of small parts being worked on may sit for a period of several hours at one location, each completed part awaiting the completion of the last one in the tray before all can be moved to the next machine location for another operation. Multiply situations like this by the number of different operations, and the total number of lost-time hours while material stands idle can become truly amazing.

This is not to say that NOPI material handling methods are inefficient; the above comments are placed herein mainly to emphasize to the reader the largely unknown but tremendous cost that can occur both in terms of money and in improper utilization of skills when insufficient thought and regard is given to the over-all picture of materials handling. The specialists in materials handling at NOPI and in every other industrial organization are well aware of it; the problem is to get an increased awareness throughout the organization of the value of optimum materials handling methods in increasing that organization's productivity.

Question Number 40. To help me do my best work, apart from experience on the job,

	8%	0.	No answer	8%	
	23%	1.	I get a great deal of the right kind of training	15%	
*	36%	2.	I get some training of the right kind	36%	(36%)
	7%	3.	I do not get enough training	10%	
	24%	4.	I get no training, to speak of	30%	
	0.9%	5.	I get too much unnecessary training	1%	

From the above, it can be noted that 59% of the Per Diem people and 51% of the Per Annum people get either some or a great deal of training of the right kind. Also to be noted is that 31% of the Per Diems and 40% of the Per Annuns state they either don't get enough training, or no training. Very few people at NOPI get too much unnecessary training. In comparing the results of this question on an inter-Departmental basis, responses to choices one, two, and three will be listed:

	Percentage Response to Choice					
	1		2		3	
	Diem	Annum	Diem	Annum	Diem	Annum
Industrial	23%	13%	37%	40%	7%	12%
Engineering	35%	12%	38%	33%	10%	10%
Research and Test	11%	17%	50%	33%	0%	6%
Quality	17%	20%	33%	41%	11%	10%

In the above it is of interest to note that the Industrial Per Annum employees feel they do not get enough training to a greater extent than does any other Per Annum group, and that both groups of the Research and Test Department have the smallest response that they do not get

enough training. Since the tabulation of this question didn't include the job area involved, it is impossible to assess the class of employees desiring further training.

The training program at NOPI is a well integrated one and one which has met with a high degree of success and acceptability. At present the following courses are in effect:

1. An apprentice training program. Fifty-eight apprentices are being taught in seven trade areas in this program at the present time. This NOPI program is rated as being at the top five per cent of all those conducted in the State of Indiana by a representative of the Bureau of Apprenticeship. Its graduates are in great demand, both by NOPI and private industry, and a long waiting list of applicants, ensuring high calibre of entrants, is maintained in the Industrial Relations Department.

2. An on-the-job learners' course. This course is being given presently to forty male machine operators, and takes ninety days to complete.

3. A professional development course. Twenty-eight people from Research and Test, Engineering, and the naval officers stationed at NOPI are enrolled in this course at present. Instruction consists of two hours, bi-weekly, and is given by various Purdue University professors who journey to Indianapolis.

4. A supervisory development course. Forty-seven men are presently enrolled in this course, and it is to be expanded in the near future. It consists of a one-hour session once a week. It is carried on by levels of supervision, on a progressive basis.

5. An on-the-job course in tool and gage design. This course consists of full-time training for eighteen months of selected journeymen machinists. At the completion of the course, the trainees are designated as journeymen tool and gage designers.

6. A night course for machine operators. This program is for professional employees in the organization who wish to become more familiar with machines and their operation. Attendance is on a voluntary basis, and NOPI furnishes qualified instruction.

7. Indoctrination and orientation courses. All new employees at NOPI are given this training. It consists of two sessions. The first, lasting three hours, includes a briefing about NOPI in general and a conducted Plant tour. This is given prior to the new employee's reporting to his Department. The second three-hour session is conducted after the employee has been on the job a minimum of two weeks, and is primarily utilized to answer questions on work situations, policies, regulations, and any other items of concern and/or interest to the employee.

8. Though not a formal course, the library. This was described under the general description of the Ordnance Plant. Its use by all employees is encouraged, and books may be removed on a loan basis for home study; of course, security regulations for classified material prevent taking certain types of publications home, but access to these is open to those whose job requires their use and who are properly cleared.

With the above information in mind, some of the representative comments written-in by survey respondents on the line provided for this question may be interesting to the reader. Following the comment will be the number of questionnaires submitting it or one very similar to it, enclosed in parentheses.

1. Too much friction and misfits among supervisors in department. (1)
2. I would like shop work on my own time. (1)
3. I would like to retake the supervisors' course. (2)
4. The others in this department are too busy to train me. (1) (The above from a woman in the clerical job area)
5. We need more supervisory training here. (2)
6. The machinists get more help than the operators do. (1)
7. Supervisor course offered by local institutions are waste of time. (2)
8. I learn by making mistakes. (1)
9. Approximately 2 hours a month should be set aside for supervisors to get together for conferences in each section. (1)
10. Work is of such a nature that specific training is not applicable. Problems are settled as they arise. (1)
11. All lectures, movies, etc., are for supervisors only. (1)
12. Teachers need more training to teach. (1)
13. Proper training is needed. (2)
14. More training is needed on instruments. (1)

15. College grads can receive additional schooling; others cannot at plant. (1)
16. Utter disregard for training in this department. (1)
17. With the experience I have, I can train others. (1)
18. I learn a lot from my immediate supervisor. (1)
19. Most knowledge is gained from experience. (3)
20. Could use technical information from library, but difficult to draw out to take home and no time on job. (1)
21. I believe there should be a few specific instructors for training rather than working personnel doing the training. (1)
22. Could use more training. (6)

The above is representative of the comments; no general trend is evidenced by them, but some reflect the need for getting the correct information to people at NOPI, for they reflect a lack of knowledge concerning policies or procedures in effect. For example, note 2 and 20 above.

Both the need for and the desire for more supervisory training is demonstrated throughout the questionnaire. Since an expansion of the supervisory development program is planned, it should gradually aid in this area. The previously recommended training in human relations, basic psychology, and certain areas of industrial engineering for supervisors, especially at the first level, might well be included in this program.

Question Number 41. When I have a personal problem, the person I usually go to for help is

	4%	0.	No answer	4%
	35%	1.	My supervisor	38%
*	8%	2.	A fellow worker	9%
	43%	3.	Nobody; I try to work it out for myself	38% (41%)
	2%	4.	A member of the Employee Relations Division	0.8%
	7%	5.	Someone outside the Plant	10%

Inter-Departmentally, there wasn't much difference in response by either Per Annum or Per Diem employees to this question. Less Per Diem personnel in Industrial (34%) go to their supervisors with personal problems than do those in Research and Test (50%), in Engineering (42%), or in Quality (40%). The Per Annum people in Engineering consult their supervisors less (35%) than those in Quality (45%), Research (41%), or Industrial (37%). Very few in any Department go to the Employee Relations Division with their personal problems, the largest responses in this category being 2% for Per Diem workers in both Industrial and in Engineering.

NCPI 65.5-7, entitled "Counseling" states in part:

. . . The primary management responsibility for the solution of problems growing out of the working situation, such as personal adjustment to the job, rests with line supervision. In unusual cases, line supervision may request guidance and assistance from the Industrial Relations Department. On the other hand, employees with personal problems not arising from the job, although they may interfere with productive output, should be referred by activities to naval or appropriate community agencies for assistance. It should be borne in mind that the primary responsibility for handling personal problems is that of the employee himself . . .⁵²

It would seem that the results of the opinion questionnaire reflect the above policy. In this regard, the Naval Ordnance Laboratory opinion survey was similar in its findings; there, over-all, 3% of their employees turned to the Employee Relations Division, 31% to supervisors, and 43% attempted to work their problems out for themselves. Corresponding figures for NOPI are: 2%, 37%, and 41%, showing

⁵²NCPI, op. cit.

similar results. During several interviews with higher-level supervision, the writer was impressed by the general good knowledge of counseling methods exhibited by these men. Many case histories were discussed where undirected, or so-called "cathartic", interviews aided the employees in locating their real problems and in helping to find answers. As is so often true, the mere understanding of the problem aids in effecting a workable solution in many cases. This seems to be especially true in the case of women employees, of whom about 800 are employed at NOPI. Many times, however, first-level supervision hasn't received enough training in, or doesn't see the need for, counseling, and it is in this area that improvement possibilities are suggested. Conference training sessions with widely-made-use-of role playing might be one method utilized to advantage.

Question Number 42. Do you feel that the present Civil Service system for Performance Rating does rate you fairly in your present job performance?

4%	0.	No answer	5%	
41%	1.	Yes	32%	
19%	2.	Don't know	14%	
* 36%	3.	No	49%	(40%)

These responses see quite a difference of opinion between the Per Diem and the Per Annum personnel. More Per Diem people answer "yes" than "no", by a few per cent, while considerably more Per Annum employees answer "no" than "yes". An inter-Departmental break-down of response to choices one and three follows:

Percentages of Response to Choice

	1		3	
	Diem	Annum	Diem	Annum
Industrial	42%	33%	34%	51%
Engineering	38%	30%	42%	49%
Research and Test	22%	32%	56%	38%
Quality	31%	34%	48%	59%

It can be seen from the Departmental break-down that, except for the Industrial Department Per Diem personnel, all other groups in all Departments believe that the Performance Rating system presently in use does not rate them fairly. In this case, due to the large number of people in the Industrial Per Diem group, its effects far overshadowed the responses of the other Per Diem groups.

Procedures for performance rating of governmental employees are based on the Performance Rating Act of 1950. This provided for official rating of all employees in one of three categories on an annual basis. The categories provided are: outstanding, satisfactory, and unsatisfactory. If an employee is rated either "outstanding" or "unsatisfactory", justification must be given for the action, entailing considerable effort on the part of the rater. If rated "satisfactory", merely including the employee's name on a list of names designated satisfactory suffices. The entire procedure, purpose, and details of performance rating are contained in NCPI 130. According to NCPI 130.6-3, the category of Satisfactory:

. . . includes performance ranging from excellent to just above unsatisfactory. It is the level at which most employees will be rated. Factor marks at this level are not required to be supported in writing,

although they may be so supported. Such supporting information, even when the factor marks are all Satisfactory, will often serve to give deserved recognition of the employee's accomplishments.⁵³

During the last rating period for NOPI, from May, 1952, to May, 1953, no employees were marked "unsatisfactory" and only 0.47% of the employees were rated "outstanding", showing the very infrequent use made of these categories. For what the employees wrote-in on the provided comment space for this question, please see the below listed representative items. The numbers in parentheses again indicate the number of questionnaires on which that comment, or a reasonable facsimile thereof, was submitted.

1. Too general, or Not enough grades. (20)
2. Sub-average rated same as above average. (35)
3. The new form is ok. (1)
4. Too hard to get better than 3 regardless of performance. (6)
5. Supers won't give 0 due to extra work involved, regardless of merit. (5)
6. Length of service should be a factor. (2)
7. Source of ill-will; accomplishes nothing. (6)
8. Former method gave better rating. (6)
9. Too much influence on this by immediate supervisor. (2)
10. Favoritism shown adversely. (2)
11. It is a big joke, or Meaningless, or Waste of government funds, or Stinks. (25)
12. Contributions made to Plant efficiency are ignored at rating time. (1)
13. My department heads don't rate me fairly. (1)
14. Performance rating belongs in schools, not in industry. (1)

The above shows the variation in comments submitted. However, it shows a rather pronounced trend, more so than in any other write-in item discussed so far, of unfavorable

⁵³NCPI, op. cit.

attitudes. The majority of comments are critical of the main thesis of the Performance Rating Act of 1950, in that they want more quantitative steps than "satisfactory" between Outstanding and Unsatisfactory. They seem to feel that the sub-average worker can float through with ease, while the excellent worker gets no better recognition for his services and performance than does his drone counterpart.

Except to point out this question's responses as a fact existing at the Ordnance Plant, the writer can assess no measure of the effect of this unfavorable attitude on productivity of workers. It is considered that the manner in which the Performance Rating Act of 1950 operates is such that considerable expense and effort could be saved by the complete abolishment of any rating system in governmental activities. If an employee is so bad that he is "unsatisfactory", he will probably be released, anyway, and if so good that he would deserve "outstanding", it is assured that his talents would not escape notice in the organization.

Question Number 43. How much of your working time do you feel is devoted to handling "red tape", that is, paper work which seems to needlessly complicate your job performance?

	12%	0.	No answer	5%	
	65%	1.	0 to 5%	57%	(62%)
*	14%	2.	6 to 15%	22%	
	6%	3.	16 to 25%	9%	
	7%	4.	More than 25%	4%	

As would possibly be inferred, the Per Diem employees seem to be less involved in the handling of red tape than do the Per Annum employees. On a Departmental basis, the responses to choices two, three, and four were as follows:

	Percentages of Response to Choice					
	2		3		4	
	Diem Annum		Diem Annum		Diem Annum	
Industrial	14%	15%	6%	10%	2%	9%
Engineering	12%	24%	2%	10%	8%	8%
Research and Test	0%	20%	11%	6%	0%	4%
Quality	19%	27%	11%	10%	7%	1%

As mentioned in question 15, any employee must conform to the boundary conditions of his employment. In national government activities, these boundary conditions are more numerous than in a majority of private industries. There are more levels in the chain of command. Not only basic legislation requirements which are passed from the top down, but intervening policy and regulation requirements and customs and traditions are superimposed at each of these levels. Due to its being so widespread and gigantic in size, activities under the Department of Defense must conduct operations and utilize procedures according to its basic policy, and with little personal contact but a tremendous amount of written communication. Reports, regulations, letters, forms -- their variety is legion and their number limitless. Added to this unyielding amount of paperwork (including upward and downward communication with the Bureau of Ordnance, NOPI's immediate superior in the chain of command, and great amounts of liason correspondence

with private industry, other Bureau of Ordnance activities, the community of Indianapolis, and the State of Indiana, among others) can be placed excessive amounts of paper-work caused by poor administrative procedures within the Ordnance Plant, lack of training as to what is desired by supervisors, and lack of skill in preparing proper correspondence.

For example, one middle-level supervisor gave the writer this example: He prepared a report on a technical subject, on which he is considered an expert, and handed it to his immediate supervisor in the rough form for approval. This latter supervisor read through the report, approved its technical content, but made minor changes in the English usage. The report then went back to the originator, was corrected as requested, and a smooth copy made. The smooth copy was approved by the immediate supervisor and went up to the next higher level. Here again the technical content was approved, but once more minor grammatical changes were incorporated into the text which necessitated the letter's going back to the originator, being retyped, and finally being approved for transmittal and signed by the appropriate, responsible Division Head.

It seems possible that the above waste of human energy, time, and talent could be corrected by a) better communications as to what style of letter is desired by the signing superior within the framework of basic Navy instructions

for the preparation of correspondence; b) less administrative levels of supervision being required between originator and approver of a letter; and c) a basic evaluation of the content of the letter as to completeness and clarity, and less emphasis on the usage of "the" for "an" and similar minor changes which are not pertinent to the letter's meaningfulness and clarity. The concept of "completed staff work", wherein the originator prepares correspondence for his superior's signature so that a minimum of revision and correction is necessary, and where the originator mentally places himself in the position of the supervisor ultimately responsible for the letter and asks himself, "If I were in Zeke's place, would I sign this letter as it is presented to me and accept responsibility for it?", could stand a great deal of emphasis throughout all levels of the organization. Productivity increases in all branches at NORI should result from the application of this "completed staff work" principle. Perhaps the concept of setting up acceptable limits for approval of paper-work on the parts of all supervisors would be helpful, just as tolerance limits are set up as the criterion for passing or rejecting a machined part. In any event, excessive barriers to the already complex procedure for preparing paper-work in any form should be investigated and remedied as and where applicable. The figures listed at the beginning of this question's

discussion indicate that all Departments could profit thereby; as a corollary to the increased productivity which can result, employee satisfaction and freedom from frustration or anxiety may well occur.

Question Number 44. Concerning the Navy Employees

Beneficial Suggestion Program

6%	0.	No answer	4%	
12%	1.	I have submitted one or more suggestions and have had one or more accepted	11%	
14%	2.	I have submitted suggestions but have not had any accepted	15%	
*	59%	3. I know about the program and like it, but have not submitted any suggestions	62%	(59%)
5%	4.	I know about the program and don't like it; I haven't submitted any suggestions	6%	
3%	5.	I do not know the details of the Program	2%	

Since this question precedes several others that bear on the subject of the Beneficial Suggestion, or "Benny", Program, as it is short-titled at NOPI, a rather lengthy discussion and evaluation will be presented here. From the above figures, it can be seen in general that about 60% of both the Per Annum and Per Diem employees like the Program and know about, but have not submitted suggestions. Only about 5% of the employees in both groups have not submitted suggestions and do not like the program; comments were submitted on this question which may help explain the reason for this opinion. Only about 3% don't know the details of the Program. Altogether, 26% of both Per Diem and Per Annum employees have submitted suggestions to the Program.

On an inter-Departmental break-down, responses will be shown for choices one, two, and four:

	Percentages of Response to Choices					
	1		2		4	
	Diem	Annum	Diem	Annum	Diem	Annum
Industrial	12%	11%	14%	18%	6%	4%
Engineering	15%	6%	22%	17%	2%	9%
Research and Test	17%	9%	17%	9%	6%	4%
Quality	12%	24%	16%	15%	2%	2%

This comparison shows that: 1) participation among Per Diem employees ranges from 26% for Industrial up to 37% for Engineering; for Per Annum employees, 18% for Research up to 39% for Quality; 2) a higher percentage of suggestions from Quality Per Annum and Research Per Diem employees have been more widely acceptable than those from any other groups; 3) a higher percentage of Industrial and Research Per Diem, and Engineering Per Annum, employees know about the program and don't like it, and haven't submitted suggestions, than any other. It therefore appears, on the whole, that the Suggestion Program is well received and is participated in at NOPI by all Departments and both groups of workers. Possibly some of the unfavorable opinion toward the Program may be due to the reason that unreliable or biased information has been circulated among fellow-employees who did not have a suggestion accepted, or who had one which was considered to be within the normal area of his job. Perhaps it may be due to a supervisor's tactless blocking of suggestions in a particular group.

However, there still remains a high percentage of employees (59% over-all) who have not submitted suggestions. This figure represents a dormant giant; the problem is to awaken him and enlist his active participation in looking about him, examining practices and methods for doing jobs in the present manner, and suggesting improvements. With 3000 people aware of and alert to 3000 work situations and a multitude of methods, it seems reasonable to expect that more and better improvements can be suggested than can be done by 750 participants, or can be done by members of management alone. Of course, certain types of individuals and working situations are more conducive to the submission of suggestions than are others. Generally a small proportion of employees provides the bulk of suggestions, but through increased employee awareness and training, it is believed the proportion could be increased and maximized. A work simplification training program would constitute a step in this direction.

Authorities differ in their concepts of how many suggestions should be considered standard in regard to working population. Yoder states: "Experience indicates that -- in an average plant -- suggestions average about 200 to 300 per thousand employees each year. About one-fourth of those received may be at least partially usable. Awards average about ten per cent of the savings effected by the suggestions."⁵⁴

⁵⁴Yoder, op. cit., p. 397.

Professor R. E. Balyeat of Purdue University believes Yoder's figure to be high for average submissions, and suggests that from 100 to 150 suggestions submitted per thousand employees per year is a more realistic figure.

During the six-months period from 1 July 1953 to 31 December 1953, 195 suggestions were submitted by NOPI employees; of these, 49 were adopted; the estimated savings during the first year on these adopted suggestions was \$14,640.00; the awards paid amounted to \$910.00. Percentage of participation of employees was seven per cent. These figures represent 140 employees submitting suggestions per thousand employed per year, within the average participation indicated above; an acceptance of 25 per cent, or one-fourth of submitted suggestions, in keeping with the above average; and a percentage of award paid to estimated savings during the first year of application, of 6.2 per cent, below the average stated above. By Departments which took part in this study, the results of the Program for the last six months of 1953 were as follows:⁵⁵

<u>Department</u>	<u>No. of Suggestions</u>		<u>Awards Paid</u>	<u>Per Cent Participation</u>
	<u>Submitted</u>	<u>Accepted</u>		
Industrial	84	29	\$690.00	5.3
Engineering	32	3	30.00	8.7
Research and Test	4	0	00.00	3.0
Quality	24	3	20.00	12.9
Totals:	<u>144</u>	<u>35</u>	<u>\$740.00</u>	<u>7.5 (avg.)</u>
NOPI, over-all	195	49	\$910.00	7.0

One may see from the above that the four Departments studied contributed a majority of suggestions to the

⁵⁵NOPI figures quoted from a NOPI report from the Beneficial Suggestion Panel to All Department Heads, dated 5 January 1954.

Program, both of those submitted and those accepted, participated to a somewhat greater extent than the average, over-all; and received a majority of the awards. However, a break-down by Departments shows an acceptance rate as follows: Industrial, 34.6%; Engineering, 9.4%; Research and Test, 0%; and Quality, 12.5%.

NCPI 20.7⁵⁶ sets forth the basic Navy policy in regard to the Beneficial Suggestion Program. This Instruction defines a beneficial suggestion, explains how the Program is administered, and otherwise covers all general phases of the Program. Both cash and recognition are used as incentives for eliciting suggestions from employees in desired areas for improvement. Both little ideas and big ideas are solicited. Eligibility requirements are set forth, both for employees in general and for supervisors; the concept of what constitutes "normal duties" is explained, with the proviso that the local Beneficial Suggestion Committee determine unusual cases; appeal machinery is provided for suggesters as regards the local Committee's decision, and, if not satisfactorily settled at that level, up to the Navy Efficiency Awards Committee in Washington. In the event a suggestion is not acceptable, the suggestor is required to be notified by the Committee as to why it wasn't accepted, in a personalized, friendly letter "so that the suggesters will feel like making another try. They should also convince the suggesters that the merits

⁵⁶NCPI, op. cit.

of their suggestions were fairly judged and carefully considered."⁵⁷ Cash awards are prescribed for adopted suggestions ranging from \$10.00 to \$275.00, based on a rough figure of five per cent of the estimated first year's saving. If considered exceptionally valuable or meritorious, the suggestion can be forwarded to the Navy Efficiency Awards Committee for special consideration and possibly an increase of reward. Awards for intangible benefits and safety improvements brought about by suggestions are provided for according to specified criteria. Standardized drop-boxes and forms for suggestion submission are recommended for the Program, but mail may be utilized by the employee in submitting his suggestion, and a form isn't required, as long as the suggestion is submitted in writing. The employee must be notified that his suggestion has been received and is being studied for possible adoption; in cases requiring a long period of time to evaluate, the suggester will be notified of the reason for the delay and the progress made to date; when the Committee has adopted the suggestion and determined the award to be given, the suggester is notified in writing of this action and receives his check for the suggestion. If, in the Committee's estimation, the suggestion has wider than local application, the suggestion is forwarded for further consideration by the Navy Efficiency Awards Committee. A

⁵⁷ibid., 20.7-22.

possible increase in the amount of award already paid, or, in certain cases, a salary increase of one, two, or three steps within the basic grade may result. If an employee is at the top of his salary grade, he must be given the cash award. This amounts to a maximum of 25% of the estimated savings brought about by his suggestion during its first year in operation; or, the total annual amount of three salary step increases in his grade; whichever is less. For example, the top award for GS grades 1 through 4 would be \$240.00; for GS grades 5 through 10, \$375.00; and for GS 11 through 14, \$600.00.

With the above information in mind, it might be of interest to state that at NOPI accessible suggestion boxes are provided in sufficient and strategic locations; colorful, and simply but effectively worded cartoon-type posters are placed near them so that the employees' notice is attracted; and blank suggestion forms are available at each box. Suggestions are collected from the boxes weekly and logged in by the Recorder of the Beneficial Suggestion Committee. Receipt is acknowledged. The Committee meets weekly to act on the submitted suggestions. A little pamphlet is prepared for distribution throughout the organization, entitled "Employees Handbook for the Beneficial Suggestion Program". It contains in readable, simple language the major "key points" of the Program, and is effectively illustrated to get these points across. Major

headings include: The Captain's Message, What Is a Suggestion?, Types of Suggestion Desired, Who May Make Suggestions, How Do You Make Suggestions, What Happens to Your Suggestion, What You Get for a Suggestion, Additional Awards and Benefits, These Suggestions Paid Off, and That's All There Is to It. Under each heading a brief but clear explanation is set forth. Emphasis is given to the fact that to be considered for an award, the suggestion must present a solution for, and not merely describe, the problem involved.

A comparison of the Navy Beneficial Suggestion Program's features to a list summarizing "procedures found most satisfactory in administering the suggestion program to the satisfaction of both employees and management", and set forth in the Personnel Handbook, showed that the Program complied with every one of the eight procedures listed.⁵⁸

Below is presented a representative sample of the write-ins submitted on question 44 by employees, together with the number of questionnaires containing the comment, or one similar thereto, enclosed in parentheses:

1. It's an engineer's job to suggest improvements. (3)
2. Boxes available and system easy to use. (1)
3. It is unwieldy -- unqualified people rate suggestion merits. (1)
4. This program shows much improvement recently. (1)
5. Engineers should not be paid for Beneficial Suggestions when that is their job. (1)
6. Program needs more explaining -- many don't realize its possibilities. (1)

⁵⁸Mee, op. cit., p. 558.

7. We need more information on how to write suggestions. (1)
8. The Program seems prejudiced against Research employees. (1)
9. I cannot submit suggestions -- in line of work. (1)
10. Some suggestions should be tried out before being ruled out. (1)
11. It takes a long time to get a hearing. (1)
12. Too much Engineering and supervisor influence on Program. (1)
13. I hesitate to make suggestions lest my supervisor feel I am belittling him. (1)
14. Too much time is wasted on ordinary ideas. (3)
15. Even the little suggestions are treated as important as big ones. (1)
16. I have received very high rewards. (1)
17. Engineers have a hard time collecting, since committee considers most items "line of duty". (2)
18. My supervisor discourages it. (8)
19. My supervisor would take the credit for it. (3)
20. When passed through the supervisor, he is credited with a progressive idea. (1)
21. I assist my people in preparing them. (1)
22. My suggestion was used, but turned down for award. (6)
23. My suggestion was pirated by others. (1)
24. I lost faith when a suggestion wasn't accepted. (1)
25. Insufficient incentives. (1)
26. Compensation too poor for effort expended. (8)
27. Too much politics. (4)
28. Resented by some department supervisors. (4)
29. Too much red tape and delay. (4)
30. What good would it do? (2)
31. Should not put a maximum limit on awards. (1)
32. It's my duty to submit suggestions without expectation of monetary rewards. (1)
33. Unfair handling of system. (10)
34. It is as fair as possible. (3)
35. It is a very good program. (3)
36. They say too often, 'It's a part of your job!' (4)
37. Seems that the Board looks for reasons to reject rather than reasons to adopt them. (2)
38. It depends entirely on the supervisor's help. (5)

The above listing gives a comprehensive, but not exhaustive, summary of the comments submitted. From it can be seen the very wide range of feelings concerning the Program -- some are for it whole-heartedly, some are against it without

knowing why, and so on. Suggestions do not have to be submitted via supervisors; often, however, supervisors help the employee to express himself, or give him aid in technical matters. It appears that in a few cases, supervisors have discouraged suggestions rather tactlessly, probably by telling the employee the idea was no good, but without helping the employee to see why. Here again, the oft-referred-to conference training sessions for first-line supervisors would be of aid. Possibly merely thanking the employee for his interest and participation, and then asking the employee to examine his own suggestion more critically, and to summarize its strong and weak points, would help the employee to realize why his suggestion was not applicable. Resentment is natural in cases where the supervisor says only, "It's no good, Joe; I wouldn't turn that stinker in." As one employee wrote-in regarding the next question (number 45): "It depends. I like the extra money, but suggestions which would probably not involve money go to my supervisor. He is good about suggesting that ideas which have monetary value go through the Suggestion Program." Finally, management must help the foremen and supervisors to realize that it is no discredit to them to have numerous suggestions originate in their work groups. A positive attitude toward the submission of suggestions must be built up, and this is a long-term, gradual process.

Question Number 45. I would rather pass my suggestions up the line through my supervisor than use the Beneficial Suggestion Program.

	6%	0. No answer	4%	
	21%	1. Agree	31%	
	44%	2. Disagree	34%	(40%)
*	29%	3. No opinion	32%	

The inter-Departmental response was:

	Percentages of Response to Choice					
	1		2		3	
	Diem	Annum	Diem	Annum	Diem	Annum
Industrial	22%	29%	43%	38%	30%	29%
Engineering	22%	32%	52%	31%	20%	35%
Research and Test	33%	33%	56%	33%	11%	28%
Quality	16%	28%	49%	37%	30%	33%

In all cases, the Per Diem employees in every Department indicated that they would prefer passing suggestions through the Program. However, Research and Test and Engineering Per Annum employees were about evenly divided in their opinion. This could well be a reflection of the fact that these employees' job areas more usually call for suggestions that might be considered a normal part of their jobs, so they turn more naturally to their supervisors with suggestions they may have.

Question Number 46. "Red tape" and delay are held to a minimum in the Beneficial Suggestion Program.

	6%	0. No answer	2%	
*	20%	1. Agree	19%	
	19%	2. Disagree	20%	
	54%	3. No opinion	59%	(56%)

Departmentally, the break-down was as follows:

	Percentages of Response to Choice					
	1		2		3	
	Diem	Annum	Diem	Annum	Diem	Annum
Industrial	21%	29%	18%	19%	54%	50%
Engineering	15%	15%	30%	19%	55%	64%
Research and Test	17%	14%	22%	14%	61%	68%
Quality	20%	21%	23%	28%	52%	50%

From the above, it can be seen that a majority of employees did not have an opinion on this question. Perhaps this was due to the length of the questionnaire, and the resultant belief that a "no opinion" response was the easy way out at this point! On the other hand, this could possibly reflect the fact that a majority of NOPI employees had never submitted suggestions, and therefore had little or no basis for evaluating this question. In support of the latter viewpoint, 59% of the survey population indicated that they knew about the Beneficial Suggestion Program and liked it, but had not submitted any suggestions. Here, 56% responded with "no opinion".

Of the employees reflecting an opinion one way or the other, a majority of both groups in Industrial agreed that red tape and delay were held to a minimum. A majority of both groups in Engineering and in Quality disagreed with the statement. Research Per Diems disagreed, also, but the Research Per Annuns were evenly divided.

From the above, it can be seen that employee opinion is about evenly divided on the question. It seems that the main significance of the question's response was in

validating the general level of sincerity of response to the questionnaire, by cross-comparing the over-all response to "no opinion" in this question with the over-all response to choice three of question number 44.

Question Number 47. The money and recognition given for accepted suggestions are strong incentives for getting ideas that might not otherwise be thought about.

	7%	0.	No answer	3%	
	17%	1.	Disagree	19%	
*	56%	2.	Agree	54%	(56%)
	20%	3.	No opinion	24%	

On a Departmental basis, the response was:

	Percentages of Response to Choice					
	1		2		3	
	Diem	Annum	Diem	Annum	Diem	Annum
Industrial	17%	19%	56%	61%	20%	18%
Engineering	20%	22%	52%	48%	22%	27%
Research and Test	17%	13%	50%	52%	33%	29%
Quality	15%	16%	62%	61%	21%	18%

The above breakdown shows that both groups in all Departments feel that the money and recognition are strong incentives for getting ideas from the working force. The range of favorable response over unfavorable, among those expressing an opinion, was from a minimum of two-to-one to a maximum of about four-to-one. In this question, favorable attitude toward the Program was probably far more of a factor than was the experience of actually having been given an award for an adopted suggestion, as witness the relatively low percentages over-all who had no opinion on this question. This response again emphasizes the fact that there is a wide-spread favorable opinion toward the

Benny Program by the employees at NOPI; still remembered, however, is the fact that a majority of personnel have not contributed to increased productivity of the Ordnance Plant by making use of it. Perhaps in casting about for suggestions waiting to be made, NOPI employees could apply Kipling's rule:

"I keep six honest serving men.
(They taught me all I knew.)
Their names are What and Why and When;
And How and Where and Who."

Questions Number 48, 49, and 50. What three things do you look for most in a higher level job?

(Here, three lists will be presented -- the first being first choice response by employees, the second being second choice response, and the third being the third choice response. Due to the number of the choices of response to this question, only the Per Diem and Per Annum responses will be given. If the reader is further interested, Appendix A. gives the percentages of responses to all choices of all questions in the questionnaire except the "no response" ones, separated by personnel groups within Departments, for all Per Annum and all Per Diem personnel, and for the over-all survey population.)

First Choice Responses:

2%	0.	No answer	0.8%	
38%	1.	Having more security	20%	(33%)
0.4%	2.	Having more authority	1%	
1%	3.	Being closer to the higher-ups	0.2%	

1%	4.	Having more independence	2%
12%	5.	Having more feeling that people appreciate my work	10%
14%	6.	Having a chance to do more responsible work	27%
21%	7.	Receiving more pay	26%
* 10%	8.	More opportunity to apply my training and know-how	13%

For first choice, Per Diem employees' top three percentage responses were:

First, having more security; second, receiving more pay; and third, having a chance to do more responsible work.

The top three percentage responses among Per Annum workers were:

First, having a chance to do more responsible work; second, receiving more pay; and third, having more security. The three largest percentages of response for first choice among employees by Departments follow: (The numerals represent answer numbers as listed in the question.)

<u>Percentage</u>	<u>FIRST CHOICE</u>							
	<u>Industrial</u>		<u>Engineering</u>		<u>Research</u>		<u>Quality</u>	
	<u>Diem</u>	<u>Annum</u>	<u>Diem</u>	<u>Annum</u>	<u>Diem</u>	<u>Annum</u>	<u>Diem</u>	<u>Annum</u>
Highest	1	1	7	6	1	7	1	6
Next highest	7	7	1	7	7,8*	6	7	1
Third highest	6	6	6	1	--	8	8	7

*Tie

It is seen from the above that four choices of response included the three highest percentages in all Departments, and for both worker categories. There seems to be general agreement in this connection with the Naval Ordnance Laboratory's survey results of 1952, where the three

highest rated items were 1) more money, 2) a chance to do more responsible work, and 3) a feeling that people appreciate my work. In the NOPI study, it will be noted that Industrial workers of both the Per Diem and the Per Annum groups responded identically as to things looked for. Job security rates higher among NOPI personnel than it did at the Ordnance Lab, and "opportunity to apply my training and know-how" is rated highly by Per Diems from Research and Quality, and by Per Annum employees in Research. Expected were the high percentages to "receiving more pay" in the Per Annum responses, but as somewhat of a surprise came the nearly as high percentage reflected by the relatively-better-paid Per Diem people.

Second Choice Responses:

	5%	0.	No answer	4%	
*	11%	1.	Having more security	11%	
	08%	2.	Having more authority	2%	
	05%	3.	Being closer to the higher-ups	0.2%	
	3%	4.	Having more independence	4%	
	16%	5.	Having more feeling that people appreciate my work	12%	
	23%	6.	Having a chance to do more responsible work	20%	
	26%	7.	Receiving more pay	31%	(28%)
	147%	8.	More opportunity to apply my training and know-how	16%	

For second choice, Per Diem employee's top three percentage responses were as follows (by question choice response number, from first to third): 7, 6, 5. Ranking of Per Annum percentage responses on a similar basis gave: 7, 6, 8.

Here, both groups have the identical first two items, with only the third differing.

By Departments, employees' response for second choice is shown below, similarly to the way portrayed for first choice:

Percentage	SECOND CHOICE							
	Industrial		Engineering		Research		Quality	
	Diem	Annum	Diem	Annum	Diem	Annum	Diem	Annum
Highest	7,6*	6	7	7	7	7	7	7
Next highest	--	7	8	8	5	8	6	6
Third highest	5	5,8*	1,6*	6	1	6	8	8

*Tie

Third Choice Responses:

15%	0.	No answer	4%
9%	1.	Having more security	7%
2%	2.	Having more authority	4%
Q3%	3.	Being closer to the higher-ups	2%
7%	4.	Having more independence	8%
13%	5.	Having more feeling that people appreciate my work	10%
*	16%	6. Having a chance to do more responsible work	17%
25%	7.	Receiving more pay	23%
21%	8.	More opportunity to apply my training and know-how	24%
			(24%)

For third choice, Per Diem employees' top three percentage responses were as follows: 7, 8, 6. Per Annum employees rank their top three as follows: 8, 7, 6. In this third choice selection, the same items were selected by both groups, but with reverse order of importance in the first two. Departmental response break-down for third choice is given below, again similarly to the way already described:

Percentage	THIRD CHOICE							
	Industrial		Engineering		Research		Quality	
	Diem	Annum	Diem	Annum	Diem	Annum	Diem	Annum
Highest	7	7	8	7	2	8	8	8
Next highest	8	8	4,5*	8	1,6*	4	5	7
Third highest	6	5	--	6	--	6	7	6

*Tie

Throughout this question's responses both graded and ungraded groups' results for all three choices included use of only five choices in the eight listed variations of response. These were 1, 5, 6, 7, and 8. An array of how the over-all response for Per Diem and Per Annum resulted follows:

Order of rank	Per Diem					Per Annum				
	1	2	3	4	5	1	2	3	4	5
First choice	1	7	6	5	8	6	7	1	8	5
Second choice	7	6	5	8	1	7	6	5	8	1
Third choice	7	3	6	0	5	8	7	6	5	4

In looking for a higher level job, it can be seen from the above responses that the NOPI employees consider the following things most important: Per Diem personnel -- having more security; receiving more pay, and having a chance to do more responsible work;

Per Annum personnel -- having a chance to do more responsible work, receiving more pay, and receiving more opportunity to apply their training and know-how.

In several studies reported by Tiffin⁵⁹ some similarity

⁵⁹Op. cit., pp. 459-60.

to the NOPI results for Per Diem workers was found, in that similar types of workers in private industry ranked steady work ("having more security") above pay. In general, however, it appears that "amount of pay" is a more influential factor looked for by NOPI employees than it is in some areas of private industry. Pay levels for Per Annum employees, especially, are considerably below the going rates paid for similar capable work performed in private industry. However, general working conditions at NOPI are excellent, the majority of employees are reasonably assured of job security under Civil Service regulations, and most of them are motivated by a high sense of duty and loyalty in working for the Navy. As a result, the relatively low remuneration is effectively counter-balanced for the most part. Still, in these times of engineering and scientific talent demand, when a graduating college senior can relatively easily pick out his choice of several possible \$5,000.00 a year jobs, it is difficult to hire engineers and scientists into governmental positions which pay experienced personnel \$4,205.00 a year, the first step-in-grade salary of a GS-7; and may pay starting engineers and mathematicians only \$3,410.00 a year, the initial step-in-grade for a GS-5! Thus it can be seen that desire for more pay received would be quite influential at NOPI. The immediate effect of this pay factor on productivity is unknown. Older, more senior employees, although they may

grouse a bit about their status in comparison to other technical or professional men in the community who work for private industry, tend to stay with their jobs. However, it is difficult to build up young replacements into the organization when they enter with no retention rights or permanent Civil Service rating and get such relatively low pay. As pointed out earlier in this study,⁶⁰ only Congressional action can increase the salaries of these graded, or Per Annum, employees, so this is above and beyond NOPI control.

Questions Number 51, 52, and 53. What three items in the list below seem to count most in determining whether or not a person at your level will get a recommendation for promotion to fill a job vacancy in your department?

(As in the preceding question, the results of response to this question will be presented by means of three lists -- the first showing employees' first choice percentages, the second showing second choice percentages, and the third showing third choice percentages. An inter-Departmental break-down of response will be set forth to facilitate comparison on each choice. If further interested, the reader is referred to Appendix A. for the detailed percentage breakdowns of these employee opinion summaries.)

First Choice Responses:

4%	0.	No answer	4%
6%	1.	The amount of work a person turns out	3%

⁶⁰See footnote 2.

	8%	2.	The length of time in the Ordnance Plant	10%	
	15%	3.	The amount of initiative a person shows	14%	(15%)
	11%	4.	The experience a person has in the job	9%	
	20%	5.	How a person stands with the person he works for	15%	(18%)
*	8%	6.	The quality of work a person turns out	10%	
	1%	7.	The length of time since last promotion	4%	
	8%	8.	The ability and training a person has to have to do the job	14%	
	1%	9.	The ideas and originality a person shows	3%	
	18%	10.	Who the person knows in the Ordnance Plant	15%	(17%)

This shows that, over-all, Per Diem employees rank the order of importance of the response choices listed for this question, from first to fifth, as follows: 5; 10; 3; 4; and a three-way tie for 2, 6, and 8. The Per Annums show: a two-way tie for 5 and 10; a two-way tie for 3 and 8; and a two-way tie for 2 and 6. Again, this shows little difference in basic attitude between the Per Diem and the Per Annum response ranking. The first three items are identical. The fourth choice of the Per Diem people was "the experience a person has in the job", while for the Per Annum employees, it was "the ability and training a person has to have to do the job". Third choice of both may be taken as "the amount of initiative a person shows", although Per Annum people gave this the same response as that listed above as their fourth choice.

What is considered highly significant from the above results is that both groups, percentagewise, have as choices one and two: "how a person stands with the person he works for" and "who the person knows in the Ordnance Plant". Since these expressions of opinion are so generally felt by a major percentage of the surveyed employees, it is a strong indication that favoritism plays no little part in the promotion system at NOPI. In the above percentage response tabulation, not only the largest over-all NOPI percentage was listed, as has been done on all questions previously, but the second highest and third highest have also been presented. The total of the first two response choices of all employees is 35%, representing over one-third of the population surveyed!

The greatest value to NOPI resulting from this entire questionnaire may well prove to be the attention directed to this belief concerning favoritism. To back up this highly unfavorable percentagewise response by employees, over one hundred sixty separate comment write-ins were concerned with this subject. True, that is relatively a small number from an over-all percentage standpoint, being in the neighborhood of ten per cent; but when taken on the basis of the percentage of all comments submitted at the end of the questionnaire, it represents about one-fifth of this total.

The Industrial Relations Handbook states:

One of the chief results from an attitude survey is the knowledge it gives of different foremen. It will even be possible to prepare a percentage comparison between departments. This usually leads to increased interest on the part of foremen and department heads in strengthening the morale of their departments and in unearthing the factors that have been responsible for poor attitudes. These factors are disclosed by the specific form of the questionnaire. When physical and environmental factors are the same as in other departments, and one department is significantly below that of the others, two factors are usually responsible:

- (a) Unsatisfactory relations between the foreman and a considerable percentage of the employees. Usually such attitudes are expressed in the form of complaints about the foreman, such as:

- He is not qualified for his job.
- He does not know how to handle men.
- He cannot discipline men.
- He criticizes unjustly and improperly.
- He does not give a fellow credit for what is done.

- He will do nothing about complaints.

- He does not play fair.

- He shows favoritism. [Emphasis added]

These complaints are potent determiners of attitude. When a small number of workers give voice to them the real cause may be in the complainers, but when a reliable percentage gives them, it is fair proof that the management needs to do a better job of selection and training of foremen. Often the remedy for these complaints is not difficult to administer. Many foremen will improve quickly and noticeably when they see the results of a good survey. Others will be surly and sullen, deny the justice of the complaints and otherwise prove they never should have been foremen in the first place.

How Cliques Are Revealed: Few other causes compete with cliques as a factor in making trouble in a plant. They are difficult to detect, difficult to remedy, and even when they are known to exist, their very existence is difficult to prove. Thus we come to the second factor which brings differences between departments. It is

- (b) Unsatisfactory fellow workers. The social forces that make for a poor attitude on the part of a small percentage of employees in any one department may be of many kinds. The following are examples taken from actual studies:

1. A self-appointed social head who is not acceptable to the entire group.

2. The presence in the group of an overzealous advocate of an ism; sometimes it is a religious zealot; at other times it is a would-be union agitator; at others, a health fad-dist; and at others, a political aspirant. In any case his enthusiasm creates antagonism, and the silent partners rebel.
3. The presence of cliques. They may be formed around any issue: Geographical proximity, religious affiliations, club associations, educational interests, national attachments, or any other of the many factors that create common interests. With these cliques some employees are not sympathetic, and their lack of sympathy widens the breach between them and their fellow employees to such an extent that cooperation in any form of work is impossible.
4. A feeling of inferiority or superiority. Either is disastrous and is soon sensed by the gang and treated accordingly.

These social forces cannot easily be uprooted. It may seem cowardly to recommend a runaway policy, but in many such cases that is the only one that works. Intrenched cliques cannot easily be dissolved, and if new members are not accepted to or by such groups, transferring these employees to a more potentially agreeable relationship is the only way out.⁶¹

Despite the rather highly favorable results accruing from the general responses to the other questions asked in this study, it can be seen that NOPI employee opinion concerning this promotional question is considered to represent an unsatisfactory condition within the Plant.

The three largest percentages of response for first choice among employees by Departments follow: (The numerals represent answer numbers as presented in the question.)

⁶¹Industrial Relations Handbook, op. cit., pp. 515-17.

<u>Percentage</u>	<u>FIRST CHOICE</u>							
	<u>Industrial</u>		<u>Engineering</u>		<u>Research</u>		<u>Quality</u>	
	<u>Diem</u>	<u>Annum</u>	<u>Diem</u>	<u>Annum</u>	<u>Diem</u>	<u>Annum</u>	<u>Diem</u>	<u>Annum</u>
Highest	5	5,3*	1,10*	10	5	8	10	5
Next Highest	10	--	--	3	2	5	6,3*	4
Third highest	3	10,8*	5	8	4	2,3*		10,6*

*Tie

From the above it can be seen that "how a person stands with the person he works for" and/or "who the person knows in the Ordnance Plant" is included in the top three percentages of every group in every Department. The Engineering Department, and the Quality Per Diem employees give "who the person knows" top listing, while "how the person stands with the person he works for" is given top billing by all other groups in all Departments, except for the Research Per Annum people, who give it only second highest response and gave the most support to "the ability and training a person has to have to do the job". Also, together with the favoritism-suggesting response, two groups had an equal response percentage in the highest percentage category: Engineering Per Diems had "the amount of work a person turns out", while Industrial Per Annuns had "the amount of initiative a person shows".

Due to the situation expressed above, it is considered of prime importance for NOPI supervisory levels, from the top down, to re-examine the manner in which promotional policy is being actually carried out at the Plant, and in

their individual areas of responsibility. If a careful and searching examination and audit shows no basis for this widely-held employee opinion of favoritism existing to a large extent, the facts should be presented and discussed with the working personnel. If, on the other hand, the examination, investigation, and audit do show favoritism to be present in many areas, positive and swift means must be taken to halt this practice before an over-all drop in morale and attitude of the working force takes place.

Continuing with the employees' response to this question, the tabulation of results for what counts second-most in being recommended for promotion follows:

8%	0.	No answer	7%	
3%	1.	The amount of work a person turns out	2%	
5%	2.	The length of time in the Ordnance plant	6%	
12%	3.	The amount of initiative a person shows	13%	
14%	4.	The experience a person has in the job	15%	(14%)
18%	5.	How a person stands with the person he works for	16%	(17%)
14%	6.	The quality of work a person turns out	13%	(14%)
3%	7.	The length of time since last promotion	7%	
8%	8.	The ability and training a person has to have to do the job	7%	
*	3%	9.	The ideas and originality a person shows	5%
8%	10.	Who the person knows in the Ordnance Plant	11%	

For this second choice, Per Diem workers' three highest percentages of response were recorded on items 5, and a tie between 4 and 6; Per Annum highest percentages of

response were items 5, 4, and a tie between 3 and 6. Top ranked by both groups is "how a person stands with the person he works for", followed closely by "the experience a person has in the job", "the quality of work a person turns out", and, since it was given equal weight with the last item by the Per Annum group, "the amount of initiative a person shows".

Among employees by Departments, the second choice ranking of items in the list were:

<u>Percentage</u>	<u>SECOND CHOICE</u>							
	<u>Industrial</u>		<u>Engineering</u>		<u>Research</u>		<u>Quality</u>	
	<u>Diem</u>	<u>Annum</u>	<u>Diem</u>	<u>Annum</u>	<u>Diem</u>	<u>Annum</u>	<u>Diem</u>	<u>Annum</u>
Highest	5	4	3	5	4	3	5	4
Next highest	10	6	6	4	8	6	4	5,8*
Third highest	4	5	5	6,3*	5	4	6	--

*Tie

How the person stands with his supervisor receives top ranking from Industrial and Quality Per Diem people and from Engineering Per Annums. Industrial, Research, and Quality Per Annum employees rank experience in the job highest, and Research Per Annums and Engineering Per Diems rank the initiative a person shows foremost. As next-to-highest rated, only Industrial Per Diem employees list "who the person knows in the Ordnance Plant", indicating that this group seemingly has the strongest attitude that favoritism plays a strong part in the promotional scene.

The results for what counts third-most in being recommended for promotion show:

	14%	0.	No answer	9%	
*	4%	1.	The amount of work a person turns out	4%	
	9%	2.	The length of time in the Ordnance Plant	9%	
	11%	3.	The amount of initiative a person shows	12%	
	8%	4.	The experience a person has in the job	8%	
	6%	5.	How a person stands with the person he works for	9%	
	15%	6.	The quality of work a person turns out	17%	(15%)
	4%	7.	The length of time since last promotion	7%	
	14%	8.	The ability and training a person has to do a job	12%	
	7%	9.	The ideas and originality a person shows	8%	
	8%	10.	Who the person knows in the Ordnance Plant	9%	

On this listing, Per Diem employees' responses showed a ranking of 6, 8, and 0. Per Annum employees' percentages gave a ranking of 6, and a tie between 3 and 8.

Inter-Departmentally, the results were:

<u>Percentage</u>	<u>THIRD CHOICE</u>							
	<u>Industrial</u>		<u>Engineering</u>		<u>Research</u>		<u>Quality</u>	
	<u>Diem</u>	<u>Annum</u>	<u>Diem</u>	<u>Annum</u>	<u>Diem</u>	<u>Annum</u>	<u>Diem</u>	<u>Annum</u>
Highest	6,80*	6	3,10*	6	7	7	2	4
Next highest	--	8	--	3	.2	8,6*	3	3
Third highest	--	4	6	8	8	--	0	8

*Tie

"Who the person knows in the Ordnance Plant was tied for first ranking for third choice with "amount of initiative" among the Engineering Per Diem personnel in this tabulation;

that was its only appearance in the listing. In its first appearance in top ranking, "length of time in the Ordnance Plant" was the item given by Quality Per Diem people. Also making its first appearance was "length of time since last promotion", responded to for third choice by a majority of Research people, both Per Diem and Per Annum.

An array of the choices of items selected by personnel categories follows: (The numerals stand for the items as listed under the question.)

Order of Rank	Per Diem			Per Annum		
	<u>1</u>	<u>2</u>	<u>3</u>	<u>1</u>	<u>2</u>	<u>3</u>
First choice	5	10	3	5,10*	--	38*
Second choice	5	46*	--	5	4	36*
Third choice	6	8	0	6	38*	--

*Tie

From all the above, it can be said that, in the opinion of NOPI employees in general, what counts most as to whether a person will be recommended for promotion at the Ordnance Plant are: 1) how the person stands with the person he works for; 2) the quality of work a person turns out; and 3) who the person knows in the Ordnance Plant. These seem to hold true for employees whether they are Per Diem or Per Annum, although Per Annum employees give equal weight to first choice between 1) and 3) in the preceding sentence. Indications are that of the entire survey population, one-third to one-half of the employees believe that "how a

person stands with the person he works for" and "who the person knows in the Ordnance Plant" are two of the three most important items which determine whether or not a person will be recommended for promotion at NOPI.

In comparison to the above findings on this question, the results of the Naval Ordnance Laboratory opinion survey in 1952 indicated that the three things which appeared to determine whether or not a person there would be recommended for promotion were: 1) the length of time at the Laboratory; 2) the amount of initiative shown; and 3) how you stand with the person you work for. The Survey Committee Chairman's report to the Commander, Naval Ordnance Laboratory, stated, in part, "A large percentage of Laboratory personnel seem to feel that favoritism plays a large part in whether or not an individual is selected for promotion . . . Since most people are satisfied with the advancement they have made, this would seem to be a feeling based on what people think rather than what they have experienced."⁶² This opinion of favoritism appears to be even more pronounced at NOPI.

In conclusion, whether this attitude is justified or not at NOPI, it is present and to a wide degree. Management would do well to seek the facts and to attempt by its future actions and by strict adherence to basic promotional policy, as set forth in NCPI 160, to modify this unfavorable

⁶²Contained in a Memorandum dated 18 February 1953.

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employee attitude as to favoritism and cause it to change in the right direction.

Results of Terminal Employee Comments and Suggestions

At the conclusion of the last detailed question, number 53, of the NCPI EMPLOYEE OPINION questionnaire the form stated:

"Now, if you have any suggestions or comments that you think are worthwhile, please use the blank space below to write them. If you care to explain further certain strong feelings toward some aspect of your job and the NCPI atmosphere in general, feel free to do so."

In response to this 398 employees submitted write-ins which were classified according to the plan shown in Table 1.⁶² A wide variety of comments was expressed by the employees and an appreciable number of them did not bear directly on the content of the questionnaire. Of this entire response, 18 per cent expressed favorable comments, 69.1 per cent expressed unfavorable comments, and 12.9 per cent expressed suggestions toward some aspect of their employment situation at the Ordnance Plant. A detailed

⁶²See above, pp. 41-42. This plan was devised for this study from basic information provided in Bulletin Number 21, Polls of Employee Opinions and What to Do with Them, (Pasadena: Industrial Relations Section California Institute of Technology, 1952), pp. 19-22.

A detailed breakdown of the tabulated results by personnel group and by Departments for each item on the Classification Plan will be given to the Commanding Officer, but is too lengthy for inclusion in this report.

Although many individual items were considered significant, for reporting purposes herein only those categories which polled a response of one per cent or more of the NOPI employees participating will be listed. For each of these classifications at least one representative, possibly edited, sample comment will be presented to show the reader some typical employee opinions. The writer would like to emphasize that certain responses consisting of less than one per cent of the surveyed population were pertinent and deserving of management's attention; however, they represented fewer than seventeen individuals' opinions each, and this study is more concerned with larger group opinions.

In the following presentation of comments, each classification item to which one per cent or more of the studied employees responded will be listed individually as a separate heading. If considered to have been fully enough discussed in a related detailed question in the preceding part of this report, only a brief summary will be reported. From among all the comments submitted by employees concerning the particular area, at least one representative write-in will be selected for inclusion for each one per cent of employees who registered the comment or sugges-

tion. In order to protect the employee's anonymity, a minimum of paraphrasing may be resorted to, but in the main it will be a typical, verbatim response. In order for the reader to visualize the number of employees commenting upon the particular area, a one per cent response represents seventeen individuals, while a five per cent response represents eighty-three individuals, out of the total of sixteen hundred and fifty-four participants in the study. It will be recalled that twenty-four per cent of the total participators submitted at least one different comment each.

NOPI and NOPI Top Management. Five of the six items under this main heading received sufficient comment for inclusion.

Under the sub-heading of Organizational Policies, two per cent of the employees submitted unfavorable comments. One such submitted was:

I do not think you will find another plant of this size where the Methods Div. is under the Head of Production Control. This is not a good situation.

Another taken from this category was:

I feel that the present reorganization of engineering Dept. has lowered my morale highly because of shifting me to a group I do not know and do not like (type of work). Further more I was not consulted in any of these moves. I am contemplating quitting this plant for this reason.

It must be considered that although two per cent of employees submitted unfavorable comments concerning Organizational Policies, a great variety of expression on many differ-

ent policies resulted, of which the two above are representative, but not necessarily typical. The unfavorable comments in this category outnumbered the favorable ones by a ratio of 20:1; while they also outnumbered the suggestions submitted, the ratio of expression here was only 5:1. So that an erroneous impression is not given by merely quoting the unfavorable responses to this general topic, an example of both a favorable comment and a suggestion is presented, for this first classification category only. However, it is considered that this example's treatment of all three divisions of write-ins will serve to recall to the reader, in subsequent topic results' listings, that the minority percentage responses also contain a great deal of comment that is of interest and value. A favorable comment submitted was:

Reorganization of Engineering Divisions was needed--progress is being made. Eight hours pay is being given for less than 8 hours work in some cases.

And, a suggestion:

It is the writer's opinion that a Civilian Head working directly under the C.O. and having "a command" over all Departments would be of great benefit to this station in that (1) The command changes every two years and does not give the C.O. sufficient time to become fully acquainted with all station problems until after the first year; then the second year he hasn't time to initiate (or follow through) any improvement program. (2) A permanent Civilian Head (by the fact he is permanent) would be in a position to keep abreast of all Station activities thereby being of great assistance to the incoming C.O. in that he would be able to inform the C.O. of all activity and would be able to carry on in to new command any programs initiated by the Outgoing Command. (3) A "strong" Civilian Head over all departments and working directly under the Captain should result in

- a. More unity--(the entire station to perform "as one" rather than 3 major departments and 6 minor ones(;
- b. Duplication of work should be decreased;
- c. Better inter-department relationships.

Since no particular trend was evident in the unfavorable responses, the writer makes no suggestions for management action in this field.

Under the sub-heading of Management Attitudes, one per cent of the employees submitted unfavorable comments. One such was:

Why doesn't the dept. Head have a little more respect to the whole dept. instead of speaking to one person and turning his head to keep from speaking to others-- Put each and every one on the same basis instead of showing partiality.

The ratio of unfavorable comments to favorable comments was 10:1, and the ratio to suggestions was 5:1.

Under Management Procedures, unfavorable comments comprised two per cent. An example was:

Recently Nopi made a change in their ratings and promotions of pay. Which I believe was not fair. There had been several people get there rating and raise. And of course they got to keep it. But then others didn't for they decided you had to be hear longer. Yet others got thiers. Its alright not to give a raise to anyone. But not put you back after so many others have gotten thiers. They should find a more fair way to do such things.

The above indicates the need for the emphasis placed on explaining the reasons for changes and the meaning behind them more carefully and fully to employees, which means that communications need to be improved throughout the organization. This situation was dictated by a change in

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Civil Service regulations, and was one over which NCPI had no control. Yet, the employee blames NCPI and probably doesn't realize that NCPI was only carrying out instructions from higher authority in taking the action it did. Communication betterment might not have eased the feeling of this employee that he got "gypped", but he would have at least realized that NCPI was not the one in the picture. Another example of an employee being critical toward a management procedure is exemplified by the following:

Some of the older employees could do better in their work and would feel more like doing better if they were treated as they should be and given the opportunity to sit in on more responsible jobs and could get to their top of pay. Instead of bringing in new help all the time and stepping them up and above the older employees. This I feel is being done also in the departments by Department supervisors and by the Plant supervisors that are over the department supervisors.

Since several other comments were concerned with the feeling that NCPI "hired in" outsiders rather than promoting from within, there is some concern on the part of at least a few employees that the opportunities for their advancement are penalized thereby. For the general item concerning management procedures, the unfavorable comments' ratio to favorable ones was 20:1, and to suggestions, 10:1.

The next sub-heading, Employee Attitude toward NCPI, received the highest favorable response, three per cent.

Typical of the comments submitted were:

My past experience here at NCPI has always been happy. Every employee I have encountered has always shown interest and pride in his work. I believe we all know the importance of our jobs and have the desire to do the best

they can. The working conditions are excellent and the instruments of the latest types, which should make any employee who want to learn can do so, this is another method of job interest.

and

I have yet to find a cleaner, more satisfying plant to work in.

and

Generally speaking I feel that our personal dept. does an excellent job of screening applicants. Our factory employees are a higher type individual than I have ever found in other factories.

Here, favorable comments had a 6:1 ratio over unfavorable ones.

The next sub-head, Employee Attitude Toward Management, showed a two per cent unfavorable write-in. An example:

I have a feeling no one is to criticise management or higher supervision--Do as I say not as I do. Example: my supervisor raises "Hell" at the very mention of leave (time off). Yet he will steal more time than he approves for one of his personnel. Yet top management does nothing about it.

And another:

You can not have teamwork or meet production schedules when there is an atmosphere of dissention among employes. I have seen app. 6 or 7 promotions or advancement delegated by higher ups over fellow employes who have seniorty and more experience in their fields. Management versus Labor at this station is controled purely by Management. What I mean is the working people do not receive proper credit in recognition of thier servises. Nopi ----- leaders or ring is knot very closely with one another it would be hard for any one to work toward that goal.

A ratio of 20:1 unfavorable comments over favorable ones was listed on this response.

Supervision. Under this classification, only one item received more than one per cent of write-ins. This was the Supervisor to Subordinate one, with three per cent unfavorable response. One example was:

General working conditions at Nopi are the finest, but supervisory material chosen here can only be explained by saying "Not what you know but who!" No pride in your department results from poor supervision and shows in results obtained from each individual.

Another was:

I never saw a place where the immediate supervisors can sit and do nothing like they do at NOPI.

A third example:

The supervisors at Nopi have practiced race discrimination for so many years that they aren't ashamed anymore. For fear they will lose their jobs is the reason the Negroes seldom complain. A new supervisor is usually a fairly good guy providing he isn't in the clique.

The unfavorable response ratio to favorable in this sub-head was 5:1; to suggestions, 10:1. A considerable number of the comments reflecting unfavorably on supervision seemed to reflect an opinion that the supervisor wouldn't back up his men, and was interested too much in impressing his own boss; some also mentioned that their supervisor was driving for production so hard at the expense of human relations that production was actually falling off, scrap was increasing, and a feeling of tenseness resulted throughout their work group; still others complained that they never received credit for good work. As one employee phrased it, "If he ever came up to me and slapped me on the back and said 'That was a good job', I'd faint!" Much room

for improvement in supervision seems to be indicated, especially in the Industrial Department, where a large majority of the write-ins originated, both from among Per Annum and Per Diem personnel. The Engineering and Quality Per Diem employees also were represented, but to a lesser extent, as were the Research and Test and Engineering Per Annum people. In spite of the fact that only three per cent of the employees were represented, over-all, in the write-in here, some of the comments made would tend to reinforce the results of the detailed questions relating to supervision. As stated previously, it appears that some conference training of supervisors in industrial psychology and human relations, especially on the lower levels, seems very desirable in order to improve employee-supervisory relationships.

Job Satisfaction. Four topics under this major classification polled one per cent comments or more.

Under the sub-heading of General, one per cent submitted favorable comments. Two per cent submitted unfavorable comments, making the unfavorable to favorable ratio 2:1; the ratio of unfavorable comments to suggestions was 5:1. An example of a favorable comment was:

The most important factors for a good business connection are prevalent at NOPI. The work is fascinating, the people friendly and intelegent, and the supervisors treat us and our ideas with the dignity which we feel is deserving according to the best of their ability.

An unfavorable example stated:

When I "hired in" at NOPI, I was told that I was hired because of my Navy service and experience. Since my Navy service, I graduated from a university, but was told that my university training was not needed. No effort was ever made by NOPI to use my college training or experience and none was even attempted. Therefore I feel that NOPI wasted manpower by placing me in employment here. I am now leaving the employ of NOPI for better employment, and incidentally, better pay.

And another:

In my department, the pressure exerted upon employees to make time on the close tolerance jobs is absolutely demoralizing and invites scrap. Ease up on the pressure for time, or re-time jobs so as to make it possible for a conscientious worker to be sure and still be able to make his time. Very few including the oldest and most experienced men make time and no one does consistently. It is most discouraging to do your best and then be told you were far over time. When we do save time we receive no praise or compliments.

The last two sentences in the comment above are considered especially significant. Again, better training might help in one of several ways: 1) a carefully made analysis of the job to be done on the part of the time estimator might show that his estimated time was unrealistic, or show him that the methods used by the machinist weren't the best for careful, yet rapid work and he would thereby help the operator to make the estimated time; or 2) an occasional word of praise or reassurance on the part of the supervisor might motivate the machinist to improve his pace and increase his concentration on the part being worked with so that the estimated time didn't seem so difficult to make. Great care is taken to properly check belts and lubricate bearings periodically, for experience has proved that these preventative maintenance practices pay off for machinery.

Why not then, occasionally, drop a compliment to the operator of that machine, and consider that as a similar form of preventative maintenance, if the term "human relations" doesn't seem natural.

For the sub-heading of Advancement Opportunity, a two per cent response was recorded for unfavorable comments. There were no favorable comments in this category, while the ratio of unfavorable comments to suggestions was 5:1. Most of the comments came from Per Annum personnel and some came from each Department. An example of those submitted was:

Organizational vacancies are a prime factor in getting a promotion. It is disgruntling to reach a bottleneck where there is no chance of promotion regardless of duties and abilities. I'm certain many turn to industry for better pay when this happens.

And another:

The system for advancement is bad. Employees are listed in 3 groups or steps, i.e., 1,2,3. When reaching #3 that's tops. Eventually most men reach step 3 so they are all in one class--no chance for outstanding work appreciation.

Under Recognition of the Individual, a one per cent unfavorable response resulted. This unfavorable response was in the ratio of 10:1 over both the favorable comments and the suggestions turned in. One example of an employee's write-in was:

No credit is given for years of faithful service and contributions the plant efficiency--Nopi takes people for granted who have been here for awhile and yet will promote rapidly a new man who comes in and talks a good job. The old timers eventually have to do the job but get no credit.

Pay. Under this heading, the only item to draw a one per cent response was Internal Relationships, unfavorable comments. Its ratio to favorable responses was 2:1. An example was:

Pay incentive for Per Annum employees has been seriously neglected. Per Annum employees have not received a general pay raise since 1951 while per diem employees have received continuous increases.

This item was recognized to be above and beyond the control of NOPI by nearly all employees submitting comments; however, it is a serious factor and appeared to be the primary reason advanced for people planning to resign in the near future, of whom there were several.

Working Conditions. Under this heading, there were no one per cent responses on any item. However, a majority of the people who wrote favorable comments concerning NOPI as a place to work mentioned the excellent working conditions.

Plant Production Efficiency. There were two sub-headings in this category which drew one per cent each of employee response. One was General, and unfavorable comments led the favorable write-ins by a ratio of 5:1. An example was:

I have a lot of trouble in getting parts I take off of units to be plated. I send them to plating and then it takes a long time to get them back. They are always mixed up with somebody else's unit. I think if our department would have a box for each unit we would save a lot of time and would get more units out. They say it takes too much money to plate each unit. But I think it takes just as much money to waste time looking for enough parts to complete your unit. By the time you get all of the parts you need to finish your unit you

have spent two or three hours.at least.

The comments on this item were especially of interest from the productivity standpoint, so a further coverage will be given than the one per cent response has justified on any other subhead. Among some other comments submitted, the following general topics were covered:

1. Too little authority for NCPI to operate without awaiting decisions from BuCrd or elsewhere, although management capable and could expedite work considerably if didn't have to await the decisions.
2. Management does not seem to be interested in handling materials as few times as possible to hold operating costs down. (This employee gave no concrete solution to the problem, unfortunately!)
3. Office facilities for engineering personnel too crowded and too noisy to work efficiently.
4. Believes set-up and location of gage dept. very poor for controlling accuracy of the plant.
5. More attention should be given to unnecessary expenditures of funds through poor planning.
6. Too many jobs released to manufacture before all of the necessary performance and qualification checks are made--results in wasted time and many production changes.
7. Many good suggestions not turned in because suggestion investigation poorly managed and engineering dept. will not admit they "Didn't think of it first".
8. Believes men of tool design and supervision should be in closer contact before many of the fixtures and other devices are made, since many times fixtures are sent back to be reworked because of some minor adjustment, mainly clamping. Feel this check would save much lost time and money, plus inconvenience of waiting.
9. Has to wait for work and hunt for parts an excessive amount; feels he doesn't earn his pay, as he spends more time hunting for parts than assembling them.
10. Believes technical knowledge of men in department could be utilized more extensively in establishing harmony between departments, ironing out machining difficulties, removing production bottlenecks, and determining usability of rejected finished parts.
11. Says prevalent short comings are: lack of openminded, positive approach to problems; the "second guessing plan" for what is desired; lack of creative thinking and better ways of accomplishing things (caused large-

ly by red tape and lack of permission of individual initiative).

12. Test equipment at NCPI should be checked and damage repaired on a monthly or bi-monthly basis. This would increase confidence in test equipment and result in increased accuracy in engineering jobs done.
13. In machine shop the equipment is very good. But in Assembly we need more machines, each Dept. should have a grinder, a good monarch lathe, more large drill presses and a good Gorton vertical mill. This would save time and money.
14. Says industry relatively new to Indiana and has much to learn; impossible to take a boy off the farm and make an engineer or toolmaker out of him in a couple of years.

Although these employees are stating opinions, and in many, all different areas, it is interesting to note their desire for expressing themselves evident in the above list. Some comments, such as the ones listed in 2,3,4,6, and 8 to 13, might warrant further investigation and study by NCPI management. It does show an interest by the employees in their working environment and in how things are done. A formal training program in work simplification techniques could probably help people like these to contribute more specifically to improving over-all NCPI production efficiency in their areas of familiarity.

The other item drawing a one per cent response in the Plant Production Efficiency classification was Utilization of People, and this one per cent was likewise unfavorable. It was in the ratio of 5:1 over the favorable responses submitted, and also 5:1 over the suggestions which were written-in. An example of an unfavorable response was:

I do feel that there is much lost productive time. That

is, in many jobs, there is not enough work to keep some people busy for his or her full productive day. It is a shame and can be rectified considerably.

Several others among the unfavorable comments were along similar lines. It is very difficult to give everyone just the correct amount of work each day to so that his or her productive time is fully occupied. It is somewhat easier to schedule machine operations, where certain feeds and speeds, together with the setup times and the load and unload times, plus the personal allowances for the operator, determine how many parts can be turned out in a day, so long as the machine doesn't break down and material is available, than it is to schedule a scientist's progress on basic research, or an executive's progress in answering correspondence. Too many variables affect the latter types of jobs. On the other hand, it is rather demoralizing for some people who are working steadily to note that others, drawing the same wages or salaries, never seem to be fully occupied for an entire day. It is here that considered delegation of work load, careful planning, and more than a modicum of common sense pay off. Again, attention to the problem involved, plus a careful evaluation of that problem, usually result in effecting a more satisfactory solution than if the problem is disregarded.

Personnel Policies. It was in this general classification that a majority of employee comments was directed. Two sub-heads within this category each tabulated five per

cent of the response, both consisting of unfavorable comments. The first was Promotional Policies and Procedures. The ratio of unfavorable write-ins to favorable ones was 50:1, while the unfavorable comments ratio to suggestions was 25:1. These comments verified the results of the final detailed question, which showed a widespread employee opinion that favoritism existed to a considerable extent in the Ordnance Plant. Five different examples will be recorded below:

1. To much preference given to non-veterans. Veterans are held down because non-vets hold most of the key jobs. Veterans preference in Civil Service is a big joke. The incentive to work hard and do a good job is not recognized. There is no reward for it. A loafer is promoted just as fast as a good worker.
2. Too much preference is given non-veteran over veteran for promotions. Most of supervision in better jobs are held by non-veterans. (75% to 90%)
3. I feel strongly opposed to the present system of promotions. Many individuals who show initiative as well as adaptability are passed up to provide certain "fair haired" boys the opportunity to move ahead. This has been the common practice in the past and will evidently be practiced in the future. I could give numerous examples in all classifications of pay. It is extremely disgusting to watch such actions take place.
4. I have ask all kinds of questions on why is it so impossible for advancements for the colored fellows. No one has been able as yet to answere the question. All I get is some kind of a stall or remark. Is it possible or impossible?
5. Vacancies and open positions in supervision above leadingman level are left unfilled--or in an "acting" capacity too long.

The above feelings of favoritism in the promotional picture are not confined to any one group or Department. Among Per

Diem employees, 6% in Industrial, 10% in Engineering, and 5% in Quality commented unfavorably on promotional procedures and policies, mostly on the basis of favoritism being the main determining factor. Among the Per Annum employees, the unfavorable comments were submitted by 4% in Industrial and Engineering, 3% in Research and Test, and 1% in Quality. Especially noted were the many separate comments by veterans concerning the large number of non-veterans in supervisory positions and the fact that "at NOPI, veteran's preference means nothing". Also noted were several cases of women employees who stated that favoritism determined the promotions. The practice of placing people in "acting" supervisory positions for lengthy periods of time without promoting them to the position also came in for considerable unfavorable response.

The other section coming in for five per cent unfavorable response in the heading of Personnel Policies and Procedures was Favoritism, Bias and Prejudice. Again, the ratio of unfavorable to favorable comments was 50:1 and to suggestions, 25:1. Again, most groups in all Departments were represented. Industrial Per Diem had the largest unfavorable comment response with 7% and Quality Per Diems had 6%. In the Per Annum employees, Industrial had 4%, Engineering 2%, and Research and Test 1%. Five representative responses were:

1. With reference to questions 51, 52, and 53, I personally believe that brotherhoods, fellowships, lodge as-

- sociates, union affiliates, and various club memberships, who may bond together with their own interests in mind, belong in private industry. I had heard a long time ago that if you belong to the "clic" you got along alright but it took me a long time to find out what the "clic" was. Is it just a coincidence that so many bosses from the lowest level up belong to one of the above groups?
2. Certain answers have been given on this report due to discrimination against women in -----Dept. -- not as to salary nor rating but work assignment.
 3. There is too much prejudice shown among Catholics and Masons. If you don't belong to either you are only passing away time and getting nowhere.
 4. Minor rules do not apply to all persons. Some who never obey any rules are never questioned. This causes a lot of resentment, when another is strongly reprimanded for committing the same offense.
 5. Too much fraternizing of supervisors with a few brothers and favor seekers.

The writer has only the results of the opinion survey and the submitted comments on which to base his evaluation of favoritism. As stated in the discussion of the results of the final detailed question of the OPINION form, he considers the amount to be excessive and therefore of primary management concern. With over-all employee opinion so much more favorable toward nearly all other aspects of the NCPI employment situation, a definite problem appears to be indicated in the favoritism, prejudice, and bias area, especially as regards supervisory practices (which probably accounts for the rather lukewarm detailed question results in the general field of supervision). The indications are, however, that a serious drop in morale, an increase in turnover and, probably, a decline in productivity among the workers of the Ordnance Plant will become more and more pronounced until the situation is remedied. If management is to keep and re-

store good faith with its personnel, it should endeavor to check the actual facts by means of a careful audit of its records; if wide-spread favoritism is proved to exist, if it is true that the policies as set forth in NCPI have been by-passed or violated, then a rapid and thorough change is called for. Even as "a house divided against itself cannot stand", neither can a working group function properly when it is divided by factions and cliques which affect job performance and may even cause violations of the law.

Communications. No comments submitted under the heading of Communications totalled one per cent or more.

Employees Beneficial Suggestion Program. No comments submitted under this heading totalled one per cent or more, either.

Performance Rating. Likewise, there were no sub-headings in this category which totalled a response of one per cent or more.

Miscellaneous. Only one sub-heading in this classification totalled one per cent of employee response. This was Training Needs. A representative comment was:

There are so many things about my job that I wish to learn but no one has time to teach me; or is inclined to. I want to know where things come from and where they go to. The new employee is not made to feel welcome.

Another widely reflected one was:

There is a great need for human relation program among NCPI supervisors.

Safety

With the discussion of results of the questionnaire completed, a mention of NCPI's safety statistics will be made. Accident rates are widely maintained in industry and intercomparison between NOPI and a representative private industry is possible. Although the matter of safety was not taken up in the questionnaire, the effects of lost-time accidents on productivity are obvious and are believed to be pertinent to this study. "Frequency rates measure the number of lost-time accidents per million man-hours of exposure. Severity rates describe the number of days lost on account of accidents per thousand man-hours."⁶³ The tabulation below shows the frequency rate and the severity rate of all reported accidents at NOPI for the years 1952 and 1953. A comparison is made to show the similar accident rates in a reasonably comparable branch of private industry during 1952, the latest date for which figures are available.

ACCIDENT RATES⁶⁴

Year	NOPI		Instrument Industry	
	Frequency	Severity	Frequency	Severity
1952	.75	.013	7.3	.50
1953	.92	.011		

⁶³Yoder, Cp. cit., p. 493.

⁶⁴NOPI's rates taken from their Accident Experience Tables for 1952 and 1953. Those for the instrument industry were contained in "Work Injuries in the United States, 1952," Bureau of Labor Statistics, Monthly Labor Review, Jan. 1954, Vol. 77, No. 1, p. 32.

From the above comparison, it is seen how superior NOPI's safety record is to that of the instrument industry, which is in itself a relatively safe field.

Summary of Results

In all questions which could be compared to responses of employees as shown in the "Inside Western Electric" opinion survey, NOPI employees' percentages of favorable response were higher, and those of less favorable response were lower. This was markedly so in 1) better liking for present job; 2) present job more interesting; 3) less feeling that job entailed too much needless clerical effort; 4) present job uses more of main abilities and experiences; 5) general liking for fellow employees is higher; and 6) feeling that NOPI as a place to work is "above average" or "one of the very best". NOPI's employee response was more favorable concerning the technical ability of their supervisors than Western Electric employees to a more all-inclusive question concerning supervision. However, when asked about his ability to handle and get the most out of his working group, NOPI employees' response percentages dropped to the almost identical level of the Western Electric results.

In other questions where some general comparisons could be made with the results of a Naval Ordnance Laboratory opinion survey conducted in 1952, NOPI employees showed very similar over-all responses. This was true in general

concerning communication media and effectiveness and in certain supervisory relationships. More of a feeling that favoritism was a determining factor in promotions was present at NOPI than at the Ordnance Laboratory, and some concern about this unfavorable employee attitude was felt even by the latter activity.

Personnel at NOPI rated the Beneficial Suggestion Program favorably, but a majority had never submitted a suggestion to that Program.

Regarding Industrial engineering areas, a considerable percentage of employees was not well enough informed to state opinions on several questions. About one-fourth of the employees indicated that their work was interrupted "often" by lack of materials, tools, instructions, or supplies. Almost 90 per cent rated their equipment used as above average or better.

About 10 per cent indicated they did not get enough training, although a majority felt they received either "some" or "a great deal" of training.

Twenty-four per cent of the employees submitted end-of-questionnaire write-in comments on a wide variety of subjects.

CONCLUSIONS

It will be recalled that the reason for this study was three-fold:

1. To investigate manpower utilization and motivation in a Governmental activity;
2. To inquire into what the employees themselves think about their employment as government workers; and
3. To determine, among widely differing groups of people, their response differences to the same questionnaire; and to determine whether or not a questionnaire especially designed for a particular plant could be given successfully to all levels of employees in that plant.

Lack of Certain Productivity Data

Throughout the investigation for this study, a concerted effort was made to seek out records which would assess the actual productivity, or measure of industrial effectiveness, of the Ordnance Plant at the time this study was made. Some records, included in this study, were found and used as criteria for evaluating employee responses and for comparison with published data in American industry. Other records were located but, due to the unique position of NOPI in the manufacturing field, were not useful as standards of comparison, either with other governmental

activities or with private industry. This was due to the differences in products made, on the one hand, and to the dissimilarities in keeping records on the other. A certain few records available which could be compared with others submitted to the Bureau of Ordnance, NOPI's immediate superior in the chain of command, were not used. This was due to the need for limiting the scope of the study to practical limits and due to the differences among the personnel employed by these other activities, both as to products turned out and type of personnel employed.

Interviews with NOPI top management people disclosed that only subjective, personal estimates could be given as to relative productivity among Departments and as to overall NOPI effectiveness as related to other private and governmental activities. They were of interest, in that these personal opinions rated NOPI from "just above average", in certain comparisons to "better than the best" of any other activities. However, being based on personal judgment and not on acceptable published criteria, these estimates were not used in the study.

From the above it may be concluded that, since manufacturing cost determination is so much at variance between governmental and private industries at the present time, this type of record cannot be inter-compared. Product and personnel differences mitigate against an inter-comparison of NOPI even with other governmental activities as to

productivity, as measured by numbers of units produced per given time and by the cost of producing these units. Work measurement determination at NOPI at this time is based primarily on two systems: 1) budgetary funds versus actual expenditures, and 2) estimated man-hours versus those actually expended. Tons of production per unit time, a measure possible in some governmental activities, is completely useless for NOPI's products. Thus, only manpower records were considered to be pertinent.

Conclusions Drawn

In making conclusions concerning the three primary purposes of this study, the last will be considered first, followed by the other two.

Questionnaire Effectiveness. As shown in summary form by Table 2 and by employee percentage responses to question number 6, pages 48-50 above, a widely differing population of types of employees was surveyed. In every case, a majority of both Per Annum and Per Diem employees within every Department responded. Since tabulation completed to date did not include a break-down of response as to job area or as to whether supervisor or not, the exact number of these personnel who answered as compared with their actual numbers in the Departments was not determined. The response differences given throughout the "RESULTS AND DISCUSSION" section of this paper have been presented. The

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Per Annum and Per Diem groups, subdivided further by Departments, are considered to be widely differing in relation to each other.

It is concluded that response differences between and among these groups have been shown. In only a few of the many possible choices of reply to the questions asked was there as much as a ten per cent difference in basic beliefs held by the Per Diem and the Per Annum employees. Further sorting of the machine-punched cards made up from the individual questionnaire forms must be done before the success of the questionnaire in eliciting responses from personnel in all levels of the Ordnance Plant's organization can be assessed. On the whole, it is believed that the results of the NOPI OPINION questionnaire do represent the beliefs of the people in the four Operating Departments of the Ordnance Plant.

Manpower Utilization and Motivation at NOPI. On the basis of interviews with members of management, the evaluation of employee opinion, the investigation of records and their comparison to others published in the literature, and in observing personnel engaging in their work functions, it is concluded that manpower utilization and motivation at NOPI is on a favorable, high plane.

Regions of future improvement appear to be:

1. Supervision. Increasing the effectiveness of supervision within the Plant, especially on the first

level, by means of continued training, both in technical and in human relations areas is indicated.

2. Communications. More emphasis needs to be placed on communications throughout the organization, so that more people are informed on matters concerning them more promptly, and so that more accurate information may be transmitted downward, upward, and laterally. There is a need for more of the employees understanding meanings behind rules, regulations, policies, and procedures in order to obtain a greater measure of effective cooperation among all elements of the Command.

3. Industrial Engineering Practices. More attention needs to be directed toward teaching employees better methods for performing their functions and toward creating in their minds an awareness that productive efficiency can be increased. Costs could be reduced thereby, partially as a result of each individual's own interest in and suggestions toward his working environment.

4. Personnel Policies. Especially in the field of promotions, a careful audit of present procedures appears called for in order to evaluate a widely-held employee opinion that favoritism controls promotional opportunities at the Ordnance Plant. This was the strongest expression of an unfavorable employee attitude discovered in the entire questionnaire. Over 160 separate write-ins concerned favoritism, cliques, prejudice, bias and

discrimination; most of these were related to supervision and promotions. Prompt and effective management action is considered advisable in order to prevent a general growth of dissatisfaction.

Employee Opinion. On certain questions to which responses of NOPI employees could be related to results obtained by other employee opinion surveys, NOPI personnel indicated higher job satisfaction than similar people employed in private industry. They answered with about the same responses that employees at the Naval Ordnance Laboratory answered similar questions, except that NOPI personnel believed favoritism to be a greater factor in promotion than did the Ordnance Laboratory employees. In general, they appeared to enjoy working for the government, doing the work they are in, and being at NOPI.

Summary of Conclusions

It is considered that the Naval Ordnance Plant, Indianapolis, is well managed, staffed, and operated. Its employees are believed to be capable, alert and cooperative. The morale of the employees is high. Their productivity, based on records of turnover, absenteeism, and safety, and ability to produce high quality, reliable, and intricate aircraft firecontrol equipment is very good.

Development of personnel through training and experience is good. Indications are that more supervisory training

in industrial engineering and psychology areas would prove beneficial in increasing the motivation and job satisfaction of employees throughout the organization. Means for measuring the production efficiency of the Plant at one time relative to another need to be found. This is a very difficult item to measure due to the intermittent, non-repetitive type of manufacturing done.

The results of the survey of employee opinion should be made known to all personnel involved in the study as soon as practicable after management has studied the results and noted the feelings indicated. Management action has been suggested in some areas to improve the already superior ability of the Plant. The results of the action that management decides upon should also be made known to the employees so they are convinced of management's concern for their interest and of its good faith.

On the basis of employee responses as contained herein, future surveys will have a means of relative comparison to evaluate employee beliefs and trends in improvement or recession of those beliefs. The end result should be to make NOPI a more effective, productive place to work.

APPENDIX A

PERCENTAGE RESPONSE BREAKDOWN -- NOPI OPINION

Number of employees responding		848	40	18	81	1013	119	252	69	82	531	1654
QUESTION		IND. %	ENG. %	PER DIEM			IND. %	ENG. %	PER ANNUM		AVERAGE** %	NOPI*** AVERAGE %
				R & T %	QUAL. %	AVERAGE* %			R & T %	QUAL. %		
6)	1.	5	12	6	1	5	6	56	35	2	33	14
	2.	4	0	11	19	5	14	7	49	30	18	9
	3.	1	5		42	4	7	17	3	49	18	9
	4.	.7	0			.7	43	15	12	15	22	7
	5.	53	65	61	30	51	12	1		2	4	35
	6.	33	8	17	7	29	13	.8			3	22
	7.	2	10	6	1	2	3	2	1		2	2
7)	1.	31	28	28	32	31	31	17	28	43	26	29
	2.	55	60	72	49	54	55	60	64	51	58	55
	3.	13	12		16	13	10	23	7	6	15	14
8)	1.	43	55	50	48	44	47	29	46	62	41	43
	2.	1				.9	3	2		1	2	1
	3.	25	15	17	26	24	17	28	12	20	22	23
	4.	33	22	33	27	33	39	39	51	20	37	34
	5.	2	10		2	2	5	6	1	1	4	3
9)	1.	12	8	11	20	12	10	23	14	7	16	13
	2.	39	48	50	35	39	41	45	42	37	43	40
	3.	47	45	39	44	47	45	29	39	54	38	45
10)	1.	28	10	28	25	27	22	17	16	12	17	24
	2.	26	22	17	22	25	25	31	26	13	26	25
	3.	37	40	39	46	38	39	37	45	61	42	39
	4.	7	28	17	7	8	11	13	12	13	12	10

* - Includes 26 Per Diem employees not identified by Department.

** - Includes 9 Per Annum employees not identified by Department.

*** - Includes 110 employees not identified either by Department or by Per Diem or Per Annum.

Percentage breakdowns for most questions will not total 100% since all "no answer" percentages have been omitted.

APPENDIX A (CONTINUED)

QUESTION		PER DIEM					PER ANNUM					NOPI***
		IND.	ENG.	R & T	QUAL.	AVERAGE*	IND.	ENG.	R & T	QUAL.	AVERAGE**	AVERAGE
		%	%	%	%	%	%	%	%	%	%	%
11)	1.	38	58	56	42	40	41	31	39	50	37	39
	2.	25	20	28	20	24	28	33	32	34	32	27
	3.	6	2		6	5	3	12	6	2	7	6
	4.	3	5		5	4	2	3	1	1	2	3
	5.	19	15	17	22	19	19	15	17	12	16	18
12)	1.	62	75	72	69	64	69	51	45	65	57	61
	2.	20	12	6	17	19	18	30	28	16	25	21
	3.	13	8	22	14	13	11	16	17	15	15	13
	4.	4	5			3	3	3	10	5	4	4
13)	1.	5	2		5	5	6	7	6	4	6	6
	2.	45	40	56	51	45	50	52	49	40	49	46
	3.	49	58	44	44	49	43	41	45	56	44	48
14)	1.	60	68	72	52	60	58	49	59	71	56	59
	2.	34	30	28	40	34	35	44	33	27	38	34
	3.	4			6	4	4	6	3	2	4	4
	4.	1	2	.	1	1	2	.8	4		1	1
15)	1.	44	48	39	16	42	15	12	10	5	11	32
	2.	44	50	56	58	46	63	69	71	71	68	52
	3.	8	2	6	25	8	18	16	16	21	17	11
	4.	.9				.8	3	3	3	4	3	1
16)	1.	8	5	11	12	8	8	9	4	5	8	8
	2.	36	35	33	38	36	37	39	32	34	37	36
	3.	35	35	39	37	35	39	43	48	35	41	37
	4.	18	25	17	10	18	12	8	16	26	13	16
	5.							.4			.2	.1
17)	1.	81	88	89	81	82	82	84	90	79	83	82
	2.	17	12	11	15	16	15	13	10	18	15	16
	3.	.9			1	.9	3	.8		1	1	1
18)	1.	2			5	2	3	.8	1	1	1	2
	2.	7	5		11	8	8	11	4	6	8	8
	3.	62	52	78	46	60	60	63	59	54	60	59
	4.	27	40	22	37	28	29	23	33	33	28	28

APPENDIX A (CONTINUED)

QUESTION		PER DIEM					PER ANNUM					NOPI*** AVERAGE
		IND. %	ENG. %	R & T %	QUAL. %	AVERAGE* %	IND. %	ENG. %	R & T %	QUAL. %	AVERAGE** %	%
26)	1.	5	2	17	4	5	8	14	10	1	10	7
	2.	33	30	39	32	33	32	42	49	26	38	34
	3.	61	68	44	63	61	57	43	38	73	50	58
27)	1.	51	52	56	53	52	50	34	46	59	44	49
	2.	21	20	11	21	20	22	37	26	26	30	24
	3.	25	4	28	23	24	24	25	23	15	23	23
28)	1.	81	78	78	86	81	71	71	71	77	72	78
	2.	7	15	17	4	7	3	6	16	5	6	6
	3.	10	5	6	10	10	18	18	7	18	16	12
29)	1.	11	5		11	10	10	4	7	5	6	9
	2.	16	8	6	15	15	18	12	9	9	12	15
	3.	50	45	61	49	50	45	54	48	49	51	49
	4.	19	42	33	23	21	24	28	36	37	30	24
30)	1.	34	48	28	26	34	25	25	36	32	27	32
	2.	30	20	44	46	31	30	30	28	43	31	31
	3.	13	10	22	7	12	8	11	10	6	10	11
	4.	14	12	6	14	14	21	24	19	16	21	16
	5.	6	8		5	6	8	7	7	4	7	6
31)	1.	27	10	17	23	26	30	33	29	21	30	27
	2.	39	32	61	41	39	42	43	45	38	42	39
	3.	27	55	17	32	29	19	21	23	39	24	27
	4.	4		6	2	4	4	.4		1	2	3
32)	1.	52	42	22	56	52	53	42	39	55	46	50
	2.	37	45	50	42	38	30	49	29	37	40	38
	3.	9	10	28	1	8	13	8	29	9	12	9
33)	1.	32	30	22	16	30	15	20	17	21	19	26
	2.	53	60	61	59	54	54	57	61	61	57	55
	3.	12	10	11	22	13	29	19	20	11	20	16
34)	1.	10		6	12	10	10	11	12	7	10	10
	2.	54	65	67	57	55	48	54	61	60	54	54
	3.	7	5	22	10	7	5	3	1	6	4	6
	4.	23	28		19	23	27	25	19	26	25	24

APPENDIX A (CONTINUED)

QUESTION		PER DIEM					PER ANNUM					NOPI***
		IND.	ENG.	R & T	QUAL.	AVERAGE*	IND.	ENG.	R & T	QUAL.	AVERAGE**	AVERAGE
		%	%	%	%	%	%	%	%	%	%	%
35)	1.	6	2		1	5	5	3		4	3	5
	2.	51	52	39	51	50	45	35	14	45	35	44
	3.	15	25	17	10	15	18	26	20	33	24	18
	4.	25	20	44	33	27	28	31	55	18	32	29
36)	1.	7	10	11	9	7	10	.8		2	3	6
	2.	2	5		4	3	3	3	6		3	3
	3.	63	60	72	56	62	56	63	67	63	62	62
	4.	25	25	17	28	26	26	29	26	30	28	27
37)	1.	36	38	50	40	37	43	34	42	26	36	37
	2.	22	22	22	21	22	11	10	4	23	11	19
	3.	25	22	22	21	24	20	29	20	30	26	25
	4.	11	18	6	14	12	21	22	22	20	21	14
38)	1.	48	45	44	83	50	68	62	45	78	64	54
	2.	5	2		7	5	9	6	10	5	7	5
	3.	2			1	2	3	6	4	6	5	3
	4.	40	52	56	6	39	17	21	39	7	20	33
39)	1.	11	12	11	16	12	13	19	13	15	16	12
	2.	37	45	28	32	36	40	27	13	43	31	35
	3.	7	2	6	7	7	3	2		10	3	6
	4.	40	40	56	43	42	37	48	65	33	46	43
40)	1.	23	35	11	17	23	13	12	17	20	15	20
	2.	37	38	50	38	36	40	33	33	41	36	36
	3.	7	10		11	7	12	10	6	10	10	8
	4.	24	15	33	23	24	22	37	30	24	30	26
	5.	.8			2	.9	3	1	1		1	1
41)	1.	34	42	50	40	35	37	35	41	45	38	37
	2.	9	2	6	6	8	10	12	6	5	9	9
	3.	44	48	38	42	43	36	37	39	45	38	41
	4.	2	2		1	2		.4	1	1	.6	2
	5.	7	2		6	7	13	11	9	2	10	7

APPENDIX A (CONTINUED)

QUESTION		PER DIEM					PER ANNUM					NOPI***
		IND.	ENG.	R & T	QUAL.	AVERAGE*	IND.	ENG.	R & T	QUAL.	AVERAGE**	AVERAGE
		%	%	%	%	%	%	%	%	%	%	%
19)	1.	24	42	44	20	25	20	21	29	22	22	24
	2.	32	32	28	41	32	36	38	46	41	39	34
	3.	27	15	22	25	26	25	14	14	27	24	26
	4.	15	10	6	15	15	16	12	10	10	12	14
20)	1.	33	38	39	47	35	29	33	49	27	34	34
	2.	26	28	22	21	25	28	31	35	39	32	27
	3.	19	12	17	12	18	18	15	7	16	15	17
	4.	18	18	22	11	18	18	17	6	18	16	17
	5.	3	2		9	3	3	3	3		3	3
21)	1.	5	2		10	5	8	5	3	2	5	5
	2.	24	20	28	16	23	24	27	22	22	25	23
	3.	19	18	17	10	18	18	19	10	20	18	18
	4.	25	28	22	27	25	23	32	35	32	30	27
	5.	25	30	33	37	27	26	15	30	23	21	25
22)	1.	47	52	78	52	48	46	47	62	60	51	48
	2.	8	15	6	9	9	15	9	12	17	12	10
	3.	7	2	6	6	7	8	8		4	6	7
	4.	8	12		11	8	7	16	12	11	13	9
	5.	6	5		9	6	9	5	1	1	5	5
	6.	7	8		6	7	5	3	1	4	3	6
23)	1.	22	12	6	26	22	19	13	7	11	13	19
	2.	46	52	56	33	45	48	42	38	41	43	44
	3.	30	35	39	40	31	29	43	55	48	42	35
24)	1.	20	5	6	11	18	23	8	6	18	13	16
	2.	14	15		16	14	18	22	16	17	19	16
	3.	6	4	11	7	7	6	4	7	7	5	6
	4.	22	20	39	23	23	17	27	26	12	22	22
	5.	35	35	44	38	36	32	34	42	43	36	36
25)	1.	47	60	61	58	49	50	49	62	56	52	50
	2.	20	18	22	17	20	21	24	17	24	23	20
	3.	17	15	6	17	16	12	15	13	10	13	16
	4.	11	5	11	7	11	15	7	6	9	9	10

APPENDIX A (CONTINUED)

QUESTION		PER DIEM					PER ANNUM					NOPI***
		IND.	ENG.	R & T	QUAL.	AVERAGE*	IND.	ENG.	R & T	QUAL.	AVERAGE**	AVERAGE
		%	%	%	%	%	%	%	%	%	%	%
49) (Second Choice)	1.	10	15	17	11	11	10	11	7	13	11	11
	2.	.9				.8		4	1		2	1
	3.	.5				.5				1	.2	.4
	4.	2	5	6	2	3	.8	5	10	2	4	3
	5.	16	12	22	14	16	16	11	9	7	11	14
	6.	25	15	11	17	23	28	17	20	18	20	22
	7.	25	30	28	38	26	24	33	35	34	31	28
	8.	15	18	6	15	14.7	16	18	13	16	16	14
50) (Third Choice)	1.	8	12	17	12	9	10	5	6	10	7	8
	2.	1	5	22	2	2	3	5	6	2	4	2
	3.	.7		6		.8	3	1	1	1	2	1
	4.	7	15	6	6	7	3	9	19	6	8	7
	5.	13	15	11	20	13	14	11	9	11	10	12
	6.	17	15	17	10	16	13	19	17	16	17	16
	7.	26	12	11	19	25	25	25	16	20	23	24
	8.	21	18	11	28	21	24	23	20	27	24	23
51) (First Choice)	1.	5	18	6	4	6	6	1	7	2	3	6
	2.	8	5	22	9	8	9	9	12	11	10	9
	3.	16	12	6	12	15	18	15	12	10	14	15
	4.	11	8	17	11	11	9	8	6	15	9	10
	5.	21	15	28	11	20	18	11	16	20	15	18
	6.	7	10		12	8	8	11	12	10	10	8
	7.	1		6	2	1		7	4		4	2
	8.	8	10	6	9	8	13	13	22	13	14	10
	9.	1				1	3	2	4	4	3	2
	10.	17	18	6	27	18	13	19	4	13	15	17
52) (Second Choice)	1.	3			11	3	2	4	3		2	3
	2.	4	8	11	6	5	3	6	7	7	6	5
	3.	12	22	11	10	12	14	11	19	13	13	13
	4.	13	8	28	20	14	18	13	14	18	15	14
	5.	17	15	17	28	18	16	20	6	15	16	17
	6.	14	20		12	14	17	11	17	10	13	14
	7.	3	5		4	3	.8	10	10	5	7	5
	8.	8	2	22	2	8	8	6	3	15	7	7
	9.	3	8		1	3	3	6	10	2	5	3
	10.	14	5	6	10	13	11	8	6	7	8	11

APPENDIX A (CONTINUED)

QUESTION		PER DIEM					PER ANNUM					NOPI***
		IND.	ENG.	R & T	QUAL.	AVERAGE*	IND.	ENG.	R & T	QUAL.	AVERAGE**	AVERAGE
		%	%	%	%	%	%	%	%	%	%	%
53)	1.	4	5		4	4	3	5	7	1	4	4
	2.	8	5	28	16	9	10	8	12	9	9	9
(Third	3.	11	18		14	11	8	14	12	15	12	11
Choice)	4.	8	10		5	8	11	6	1	18	8	8
	5.	6	2	6	10	6	6	10	13	6	9	7
	6.	15	15	6	11	15	18	21	12	9	17	15
	7.	3	2	33	7	4	6	8	4	9	7	5
	8.	15	10	17	11	14	13	11	13	13	12	14
	9.	7	5		5	7	5	7	14	6	8	7
	10.	8	18	6	5	8	8	9	9	6	9	8

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